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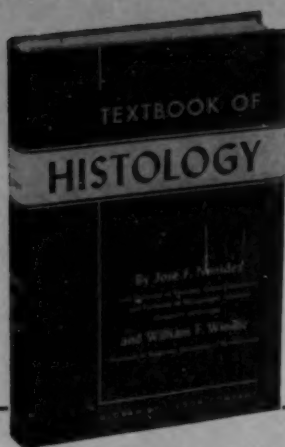
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FRED C. ZAPFFE, Editor

May, 1949

The Role of Biophysics in Medical Education

STAFFORD L. WARREN

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In attempting to discuss the role of biophysics in medical education one must first define what is meant by the term biophysics. There is a great deal of confusion about what is included in this field and there has seemed to be no definite border or dimension within which one may say—Here is where biophysics begins and ends. This is a good thing because there is thus plenty of room for exploratory discussion and clarification.

My dictionary seemed vague, for it defined biophysics as "the physics of biology" and so one is compelled to look further for more detailed and fundamental definitions and assemble that which is more understandable although apparently not less comprehensive than the brief one above. In doing so, both a concept and a philosophy emerge along with some definite areas of teaching and research which have obvious value to our curriculum.

Biochemistry, combined from bio (meaning life) and chemistry, is defined as "that branch of chemistry relating to the vital processes, their mode of action and their products."

"Chemistry is the science which treats of the composition of matter and the transformation under which it goes."

Biology is very broadly defined as "the science of life or living organisms."

Physics is the broadest of all, and is "the science that treats of the phenomena associated with matter in general, especially its relation to energy and of the laws governing these phenomena, excluding the special laws and phenomena peculiar to living matter (biology), or to special kinds of matter (chemistry). Physics is generally held to treat of (1) the constitution and properties of matter, (2) mechanics, (3) acoustics, (4) heat, (5) optics, (6) electricity and magnetism. As sometimes used in a limited sense it embraces only the last four divisions; more generally, and loosely, it includes all the physical sciences."

Physics, then, is the fundamental science and chemistry is a specialization of physics "dealing with special kinds of matter" and biochemistry, a specializa-

*Read at the Fifty-ninth Annual Meeting of the Association of American Medical Colleges, held at White Sulphur Springs, W. Va., November 8-10, 1948.

tion of chemistry in biology, as a special kind of matter. Biophysics by analogy could be a specialization of physics in biology for one needs only to insert the word "living" to make the definition of biophysics read "the science that treats of the phenomena associated with living matter in general, especially its relation to energy, etc., etc." It, in fact, becomes the science which treats of "the special laws and phenomena peculiar to living matter (biology)," (excluded by the dictionary's definition for physics).

A careful examination of these definitions indicates that there is a wide difference between biochemistry and biophysics but that in practice a great deal of what is biophysics has been utilized widely in both biochemistry and physiology, radiology and elsewhere in both research and teaching. Furthermore, that no less than biochemistry, biophysics has a very broad fundamental base and should not be limited in its applications to medicine but should take its rightful place with the fundamental sciences. In order to do so, it must become a science, a term defined as "knowledge reduced to law and embodied in system." While a good deal of progress has been made in establishing biophysics as a science, it has not been apparent because a little has been done here and there and few attempts have been made to draw the total body of information together and correlate it.

If one goes through the six divisions of the definition for physics and lists the various applications of biophysics in the terms set down above, some very interesting thoughts are evoked about the curriculum now taught in medical schools. These curricula have grown by patching together what has seemed to be related. Very often a field has been developed by one man with a particular flair in one direction and his students have expanded this particular facet, and a certain amount of emphasis (distortion) in one area has all too frequently occurred. Too often the early proprietary origin and development of the medical schools have prevented correlation and integration by physically limiting the close association of these investigators. Too often the departments of a school were organized around a tool and a procedure as if the tool were the goal within itself. Some suffer frustration in further progress of teaching and research with the original tools and seek an outlet in their research in other fields. For practical purposes efficiency in teaching and clinical service make some of this necessary. But surgery should not be limited to the anesthetic, the scapel and needle and suture; radiology to the x-ray tube and film; pathology to morphology and stains, and the microscope; biochemistry to the dipping colorimeter and test tube and so on. Neither should biophysics be restrained to the tools which may be developed in its resurgence.

Let us survey the six divisions of which "biophysics" is held to treat: First is the "constitution and properties" of "living" matter. This subject has been a field of exploration and speculation by biological researchers from the beginning. From whence comes the energy of the living protoplasm, cell, organ and individual. Here is all of metabolism. Important contributions can be made on atomic and molecular arrangements (constitution) by x-ray, ultraviolet, infra

red and raman and visible spectrographic studies in appropriate places. Energy exchanges brought about by enzyme systems have had recent study (properties). What are the laws controlling mitosis, where is the stimulus which initiates it, why are some cells freely moving and others fixed, why do cells differ and how? and ad infinitum?

Second is the "mechanics" of living matter—"the phenomena caused by the action of forces on material bodies." Here is physiology or function in the broad sense and orthopedics and obstetrics and parts of other fields as well. Here perhaps is wear and repair, and excretion and so on.

Third is "acoustics" of living matter, obviously treating of hearing and mechanical aids to hearing and mechanical waves of low frequency (blast), and supersonics of disruptive force—a rather narrow and specialized field in medicine.

Fourth is heat of living matter, divided into "heat proper which is resident in bodies and radiant heat which is a form of wave motion occurring in luminescent ether." In the heat proper field are oxidation and reduction reactions, heat (energy) exchange, gains and losses (calories), the controlling mechanisms large and small, the pore sizes of the cytoplasmic jells, the local temperature of the cell in respect to its neighbor, the organ, the fluids and so on. Radiant heat is essentially "radiology," that branch of science that relates to radiant energy and its applications," and since it involves wave motion in the ether, includes the whole electromagnetic spectrum from radiowaves (diathermy), heat (fever therapy), light (psychology), ultraviolet, x-rays and gamma rays, and as special cases, neutrons, alpha particles, electrons and mesons. The clinical and research applications are obvious. Their biological effects are now being actively studied. Radiology is a specialization of biophysics and might be called bioradiology or radiobiology. To the above definition should be added "the mode of action and their products." This is a broad field.

Fifth is optics, "the science that treats of light, vision and sight;" a somewhat limited but obvious field.

Sixth is electricity and magnetism. "Living matter" is laden with electrical forces everywhere. The stream of electrical charges over the surface of the developing ovum and embryo as the parts move about to form the foetus is a fascinating story, the currents accompanying nerve impulses in brain and periphery, the dielectric covering of certain nerves and their absence on others, memory, the unraveled telephone switchboard which is the brain, all have present their problems and applications in every branch of medicine in one respect or another. This is the field for gadgets from the induction coil, the galvanometer, the electrocardiograph to the multichannel electroencephalograph device; from shock therapy to the eye magnet. Applications in this area have hardly begun.

So far we have dealt with definitions and have indicated that biophysics is a broad field invading every aspect of medical education and research as well as the basic science of biology of which medicine is a special application. Many will quarrel with this concept, saying that the same could be said for the field

of their special interest. Or that too much is claimed for biophysics much of which is already being taught in conventional well established departments. This is true.

What, then, should be the role of biophysics in medical education? Is there a need for a new department called biophysics in every medical school? Expansion of medical or biological research during the war has shown the value of the wider use of recent developments and applications of both old and new information from physics. Part of this progress has been the result of highly organized large scale and costly war programs where data were needed quickly and equipment ordinarily unavailable and other facilities were provided. Physicists worked as part of the "biological" research team. In other cases the advantage of some development, like a mass spectograph for studying amino acid metabolism marked with a stable isotope was apparent and a physicist was brought into the team to construct and operate it. He became interested and during the program took the necessary courses in "biology and chemistry" to establish his background on a firm enough basis to be an intelligent collaborator in the team. Such a person should never be permitted to become a service handmaiden of a clinician or a biological team. Some of the physicists who worked in biological groups during the war rendered essentially and exclusively routine service functions so that they were frustrated by their experience and the field has become unpopular in some areas. There is always a great deal of routine repetitive work to any research and teaching program but such should be done at the level of a collaborator on the basis of a faculty confrere and not as a technician. Their relationship to the rest of the school should be the same as that of the faculty in bacteriology and biochemistry to their confreres.

However, their usefulness has created a need for the man trained to close this gap between physics and biology. The label of biophysicist should apply only to one whose temperament and training adapts him to thinking of any or all aspects of biology in the broad sense in terms of physical principles and phenomena. He should know enough about some aspects of the cell as a living process to be "at home" in a certain area and then to devise some physical procedure or use some knowledge from physics to unravel an unknown and basic property of the cell in order to be able to reduce his "knowledge to law and embody it in a system" according to the definition of a science. In order to accomplish this end, the training should be given in physics at the Master or Ph.D. level, or its equivalent, and, then, the equivalent of the conventional preclinical years of medical school (Master or Ph.D. level) in the biological sciences. The order in which this is done is not important nor is the area of concentration. The problem is to find the man with the right combination of instinct and temperament and the department with the right program for his thesis and where supervision is properly conducted, so that he will be stimulated to work out his own salvation.

Neither a department nor a man should be stabilized about a technique but the techniques and equipment should be used as tools to obtain knowledge.

The tools, however, should be available to work with and a budget provided whereby the tools can be built and used as part of the research program. If this be the case, any conventional department can train a man in biophysics provided his gaps in fundamental knowledge are filled by his taking whatever additional courses he may need to do so. Most men trained in this way will find a post in their own institution, usually remaining in the department where they trained, because of their own or their department's program finds the need for them there. They serve sooner or later as instructors for medical students where they will disseminate biophysical techniques and information. Thus biophysics can be and has been taught by infiltration rather than by formal courses and without the title in the catalogue. Nowadays this is particularly true of geiger counter techniques and isotopes in conjunction with many department research programs. Physiology and pharmacology do much of it as a part of their normal use of such physical equipment. Photometers and spectrometers are frequently standard equipment in many departments.

If there is to be a major department of biophysics in a medical school most of its activity will probably be focused certainly at first in the graduate area. The curriculum of the medical student is too crowded now to force even minor formal courses in biophysics upon him without drastic revision of his curriculum. Some of this could be achieved by using biophysics personnel for laboratory assistants or for special lectures and seminars in each year in various departments until the relative importance of certain aspects of biophysics is determined and fitted into the teaching schedules. In most schools the budget and space may be limiting factors for the development of a strong major department although it should not prevent the appointment with the appropriate academic rank to those who can qualify in some branch of this field.

All of this is probably obvious. Biophysics is now a matter of discussion because of the importance of isotopes and their use in research and because of the threat of atomic warfare and the need of men to deal with contamination and to teach and do research in this area. I have tried to show that the isotope technique, important though it may be, is only a small aspect of the field of biophysics.

In presuming to accept a post as professor of biophysics, my own interpretation was to consider my role to be that of exploration and adaptation of physics to medical and biological research and teaching. In my capacity as chairman of such a department I felt it was my role to find good young physicists and biologists (including fresh M.D.'s) point out the inadequacies in certain research areas, provide the budget and space, mix well with basic courses and hard work, and let nature take its course. My own inadequacies in basic and specific knowledge appear all too often and yet they are part of the tremendous challenge of the field. By attempting correlation, clarification and simplification many of these challenging prospects can be dealt with step by step as in any other field. When it comes to teaching medical students each area to be covered will have to be worked out in our new curriculum with the members of the

other departments and we must fit in where the gaps are found, solely to help give the student a broad, well rounded knowledge and a certain facility with the tools he may use in his clinical applications. More than this must be left to the graduate student or fellow and the challenge of future developments. The department must stand or fall upon its ability to deliver a necessary and workmanlike job of teaching and research.

CONCLUSION

1. Biophysics is a broad field and an old one with a recent rejuvenescence because of an influx of new techniques and applications which bring many old problems within the reach of the investigator.

2. It is necessary that the medical student be taught the newer techniques which he may find applicable in his later professional work but he may learn these from the members of the various departments in the conventional curriculum with some of the new knowledge added, or, gradually, a special department may arise whose members will be given time in the curriculum for instruction. Budget and space are practical limiting factors which may well retard the organization of a formal department of biophysics.

3. The present importance of biophysics lies in the graduate training and research areas, for new men must be trained in this field in considerable numbers.

4. A serious consideration of the standard definition of physics in light of its application to biology or living material may well result in considerable reorganization of medical school departments' programs and curricula and new responsibilities given to a department of biophysics. The extent of this future responsibility will depend upon the training and ability of the men to perform as teachers and researchers.

The Role of Biophysics in Medical Education*

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University of Texas Medical Branch
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Tomorrow's medicine will be based on today's science. Tomorrow's medicine may not be so radically different from today's, but certainly, more applications of physics will be used in diagnosis, therapy and preventive or precautionary medicine.

As biochemistry became a leading science after World War I, so biophysics is emerging as the dominant science following World War II. This is happening not only because of the tremendous concentration on nuclear physics and related problems, but also because of the great development in physical medicine, which itself is applied biophysics, and in physical approaches to almost every phase of medicine. In short, physics is supplying diagnostic and therapeutic instruments and methods of measurement which are making possible advances in every medical specialty. The discovery of x-rays and the subsequent evolution of medical radiology and now the development of nuclear physics with its great problems, serve to illustrate only two aspects of a close relation between physics and medicine which have served to revolutionize medical practice and research.

These are facts recognized by all. Yet instruction in the application of physics to medicine has failed to keep pace with expansion of the subject. The medical school curriculum has been slow to yield to the increasing pressure of new life. A new member of the family of medical science is being born, yet few institutions are prepared to receive or make use of the newcomer.

Biophysics in most medical schools at present is largely under the mandate of the physiologist. It is true that some of our institutions possess a separate department of biophysics but as such, it is used solely for research. Until that time when teaching departments in this subject are established, the physiologist primarily must be responsible for creating a better understanding of the application of physics to medicine.

At the University of Texas, the department of physiology accepted the responsibility for improving instruction in this subject and three years ago created a special course in order to introduce the importance and sound physiologic background upon which some physical methods of diagnosis and treatment are based. This course was presented according to several key principles. The first of these was the familiar principle of physics in the study of normal physiology. The second was the role of physics in the diagnosis of certain diseases, the physical aspects of which are often employed in the study of normal

*Discussion of paper by Dr. Stafford L. Warren, presented at the Fifty-ninth Annual Meeting of the Association of American Medical Colleges, held at White Sulphur Springs, W. Va., November 8-10, 1948.

physiology. The third considered the importance of physics in the treatment of disease by physical methods.

Subsequent to assignments reviewing certain basic considerations (most of which should have been mastered in premedical physics), the applications were presented by members of the faculty best qualified to give such instruction. Some of the subjects included were: mechanical principles in body movements and in orthopedics; hydraulics of the body fluids (in normal physiology and in circulatory diseases); heat (in relation to control of body temperature and to diathermy); sound (in relation to the human ear, to physical diagnosis and, of course, to deafness); optics (in relation to vision and to special instruments); electricity (in relation to instrumentation, to electrocardiography, electromyography and electroencephalography, in diathermy and in other diagnostic and therapeutic instruments). Four hours (far too few) were devoted to pertinent information on radioactivity, radioactive and stable isotopes, radiation biology and pathology, radiation detection and instrumentation. The course also included basic instruction in the physical and physiologic effects of ultraviolet and of infrared radiation and thus laid the foundation for further work in physical medicine during the clinical years.

Offered during the first semester and in the form of twenty-one lecture demonstrations, the course is believed to be a pioneer in relation to current interest in biophysics and physical medicine as supported by the Baruch Committee. The program was completed with such gratifying results that both the administration and I are convinced that the step was in the right direction. Moreover, the real proof of the pudding lay in the response of the students to such instruction. This was uniformly good, if not enthusiastic. In fact, the students themselves suggested that such work be regularly offered. In consequence, a division of medical physics was created within the department of physiology and the work is being repeated for the fourth time next spring as a separate course within the framework of physiology, where, in my opinion, such instruction should be given until adequate funds and personnel permit the establishment of a separate department of the type Dr. Warren and others plan.

To determine the emphasis being placed on the teaching of physics in other medical schools of this country, we sent a questionnaire to the dean and the chairman of the department of physiology of sixty-eight four-year schools.

The questions posed were:

1. Do you feel that the application of physics to medicine receives sufficient emphasis in medical schools?
2. Does it receive sufficient emphasis in your school?
3. Are attempts being made now to stress the application of physics in your school?
4. If such attempts are being made, what subjects are given special consideration?
5. Do you plan to improve instruction in medical physics in your school?
6. If you feel that further improvement in the teaching of medical physics is desired, should such instruction be the responsibility of the department of

physiology, the several preclinical and clinical departments concerned, or a special department (biophysics)?

7. Do you believe that biophysics will ever occupy a position in the medical curriculum somewhat similar to that of biochemistry?

8. Do you have any suggestions or comments to offer?

Replies were obtained from fifty deans and fifty-eight professors of physiology, representing returns of 75 and 85 per cent, respectively. An analysis of the returns, published in the March issue of the JOURNAL, follows:

Questions		Returns			
		Yes %	No %	Indefinite %	Omitted %
1. Do you feel that the application of physics to medicine receives sufficient emphasis in medical schools?	Deans	12.0	68.0	8.0	12.0
	Profes.	12.1	75.8	6.9	5.2
2. Does it receive sufficient emphasis in your school?	Deans	26.0	60.0	4.0	10.0
	Profes.	22.4	65.6	3.4	8.6
3. Are attempts being made now to stress the application of physics in your school?	Deans	60.0	26.0	2.0	12.0
	Profes.	62.1	24.1	3.2	8.6
5. Do you plan to improve the instruction in medical physics in your school?	Deans	72.0	12.0	2.0	14.0
	Profes.	58.6	18.8	5.2	22.4
7. Do you believe that biophysics will ever occupy a position in the medical curriculum somewhat similar to that of biochemistry?	Deans	56.0	25.0	8.0	10.0
	Profes.	43.1	34.5	12.1	10.3

For Question 4 (If attempts are being made to improve medical physics, what subjects are given special consideration?), the breakdown was similar for the two groups. Arranged according to frequency of listing, the subjects were:

DEANS

1. Subjects pertaining to general physiology
2. Radioactivity (radiology, nuclear physics, isotopes)
3. Electrophysiology (neurophysiology, electrocardiography, electroencephalography)
4. Physical medicine
5. Optics
6. Electronics—cathode rays
7. Basic physics—review and applications
8. Biological measurements
9. Energy metabolism
10. Aviation medicine

PROFESSORS

1. Radioactivity (radiology, nuclear physics, isotopes)
2. Those pertaining to general physiology
3. Electrophysiology (neurophysiology, electrocardiography)
4. Biological measurements
5. Optics
6. Physical medicine
7. Hemodynamics
8. Basic physics—review and applications
9. Energy metabolism
10. Body mechanics

Question 6 (If you feel further improvement in the teaching of medical physics is desired, should such instruction be the responsibility of the Department of Physiology, the several preclinical and clinical departments concerned, or a special department such as biophysics?) was answered as follows:

	Deans (47)	Professors (56)
a. Physiology	23.4%	42.8%
b. Preclinical and clinical departments	23.4%	26.8%
c. Special department	34.0%	17.9%
d. Biophysics in physiology	17.0%	10.7%
e. Physical medicine	2.2%	1.8%

As would be expected, the comments and suggestions offered in response to Question 8 were widely divergent. Some of these—samples of various views expressed—are incorporated to provoke further comments by participants of this symposium.

1. I would expect the next decade to show as striking a development in biophysics as has occurred in biochemistry since World War I.—Dr. A. B. Hertzman, St. Louis University School of Medicine.

2. Actually, today physics is more widely and accurately applied clinically than other science diagnostically, and is, of course, extensively applied in the treatment. A Department of Biophysics was established here in 1939 and a Department of Clinical Physics has been under consideration for some years.—Dr. C. C. Guthrie, University of Pittsburgh School of Medicine.

3. We plan a department of physical medicine to embrace such subjects as radiology, physical therapy, and the more fundamental subjects of biophysics.—Dr. H. C. Lawson, University of Louisville School of Medicine.

4. A certain amount of biophysics must, we feel, be taught in physiology under the present existing system of premedical education. It is my feeling that a separate course in that subject should be given, but not necessarily by a separate department. It might well be given by a physiologist.—Dr. J. Raymond Johnson, Long Island College of Medicine.

5. Biophysics should be initiated as a subdepartment of physiology, with the intention of its becoming an independent unit as its usefulness and applicability increase.—Dr. Otis M. Cope, New York Medical College.

6. Instruction in biophysics should be given at several levels but chiefly by the department of physiology. Additional time would be required. It could only be provided by cutting other courses like anatomy.—Dr. Emil Bozler, Ohio State University College of Medicine (for Dr. Hartman).

7. Biophysics is being developed here in several of the preclinical and clinical departments for research. Teaching is largely confined to the Department of Physiology.—Dr. Howard Curtis, Columbia University College of Physicians and Surgeons.

8. Biophysics, biochemistry and physiology should be organized into one well integrated course.—Dr. J. F. Fulton, Yale University School of Medicine.

9. I personally would prefer to see biochemistry and physiology combined, or if not, a smaller course in biochemistry and an equally small course in biophysics, with physiology given afterward and synthesizing the two (with added material, of course). Medical students have not had enough previous training in physics before coming to physiology.—Dr. E. C. Albritton, George Washington University.

10. A Department of Physical Sciences is projected. It will incorporate subdepartments of chemistry and of physics and will occupy the position in the curriculum now taken by biochemistry. It will be responsible for teaching and research in the basic principles of biochemistry and biophysics and in the design of physical instruments. Training in the application of these instruments to particular physiological and medical problems will remain with the departments interested in these applied fields.—Dean Currier McEwen, New York University College of Medicine.

11. Before any training in biophysics in the medical school could accomplish very much I believe that something must be done to convince our premedical students of the importance of an understanding of the basic principles of elementary physics.—Dr. Robert W. Lackey, Southwestern Medical Foundation.

12. I do not believe that much can be done by individual schools. Medical teaching needs organization with a view to getting students better prepared in physics and with time allotted to the development of this subject in the medical course.—Dr. H. C. Bazett, University of Pennsylvania School of Medicine.

13. I do not favor a special department of biophysics. If there is to be additional emphasis placed on physics in medical school then I believe it could best be done through the Department of Physiology by a member of the department particularly interested and specially trained in this field, but not necessarily confining his activities to biophysics.—Dean W. H. Moursund, Baylor University College of Medicine.

14. In my opinion, physiology deals with the application of physics and chemistry to biology. Biochemistry in its development as a separate division or department has taken a great deal of chemistry away from physiology. What will be left for physiology if biophysics develops as a separate department? I am aware of the arguments for a separate department of biophysics but still think biophysics can develop as a division of physiology.—Dean Joseph C. Hinsey, Cornell University Medical College.

15. It is my feeling that a good department of biophysics would take over so much of what is now physiology that the rest of it could easily be passed along to biochemistry or anatomy. I see no need therefore for another teaching department nor any time for the overburdened student to spend in it.—Dr. W. O. Fenn, University of Rochester School of Medicine.

In addition, the views of two other well known medical educators whose opinions were not solicited in this survey, are pertinent. One is that of Lovatt Evans, eminent British physiologist, of the University College, London, who, writing in *Lancet*, states:

"It now seems that, just as physiology budded off from anatomy and then itself threw off, as an offshoot, the subject of biochemistry, so now it is preparing to develop another new branch called biophysics. Moreover, the fear has been expressed that, with the handing over to specialists, each maintaining with no little heat his various opinions, of such branches as histology, biochemistry, general physiology clinical science, nutrition, experimental pathology, pharmacology, endocrinology, and so forth, any further branching will imperil the parent trunk. My view is that this fear represents a parochial view and that the ultimate parent trunk is knowledge. Perhaps some hard pruning of old wood might encourage still more vigorous new growth, especially if combined with judicious disbudding. . . ."

The other view is that of Alan Gregg, Medical Director of the Rockefeller Foundation, who states:

"Of course a much more inclusive and significant development, in which physical medicine would be but a small part, would be the recognition of biophysics on a basis similar to that of biochemistry. True, it would belong close to physiology and at first would derive from physiology as did biochemistry. . . . I argue here for the explicit acknowledgment of insidious reality: physics is applied to medicine, physics is required for entrance to medical school, and yet deliberate recognition or energetic development of the potentialities of bio-

physics is left as the responsibility of no one in particular, leading a grant-in-aid existence until its value as a companion piece of biochemistry is finally admitted. . . . Among my major hopes let me record the wish that biophysics may be soon recognized as the brother of biochemistry, even if it is too late to consider it a twin."

SUMMARY

The importance of biophysics in medical education has always been great, but it is particularly so now. Instruction in the intelligent and safe use of physical agents (such as electricity, radioactive isotopes, ultraviolet light, x-rays, short waves sound, heat and cold), together with the underlying physics, physiological effects, methods of application and the conditions for which they are useful, should certainly be included in the training of every medical student. Indeed, the present indications are that most medical schools intend to weave into an already tightly fabricated curriculum a heavier design of the expanding subject of biophysics. How the additional instruction is to be given is largely an institutional matter, dependent chiefly upon personnel and finances. Since the curriculum is full, the proposal does not necessarily demand the creation of a new department or even a new division. Nevertheless, certain schools have or are planning to have a special department for teaching and research in biophysics.

Dr. Warren occupies a unique position. He, presumably, can develop biophysics as he wishes, unhampered by existing committees and grudging department heads unwilling to make room for the young and vigorous newcomer. If ever there were an opportunity to create a curriculum in keeping with present conditions and needs, his is it. We look to him for leadership and wish him the best of luck!

DISCUSSION

DR. A. M. BRUES (Argonne National Laboratory): In discussing Dr. Warren's very judicious and forward looking paper there are one or two points that I think might be worth further emphasis. In the first place, the situation regarding training of individuals in biophysics is looked on by many people as both urgent and peculiar. You must remember that biochemistry, which has been used throughout the morning as an analogy, had something like half a century in which to develop to a point where biophysics may find itself within the next decade. There is a great shortage of individuals who are capable of looking from either side of the fence over into the field on the other side. The Atomic Energy Commission has recognized, in view of some of the necessities of life, that there is an immediate need for training, and has therefore established fellowships, which amount, essentially, to supplementing or brushing up on undergraduate training in physical science, followed by an apprenticeship. An apprenticeship in various pertinent fields is readily available, and a few schools, as we have heard, have been in a position to take biophysics seriously as a discipline in its own right.

I should also like to point out that the medical schools have, in a very real sense, pioneered in biophysics, although it is a science which is basic and academic, as well as one with practical applications. When we look around, we find it is the men within the medical schools who have, more than any other group, forwarded the progress of biophysics. Most medical schools have found themselves in a position of needing some more or less centralized control of radioisotopes. That is a small branch of biophysics. It turns out to be rather expensive.

It might be worth mentioning that in the course of obtaining this centralized authority or group of authorities which handle the practical problems relative to isotope handling, there is a real opportunity to look for the type of man, ordinarily a physicist, who is willing to leave his field to the extent that he consults and collaborates with the various interested departments without the establishment of a department of biophysics. I visualize that in most schools for a long time to come, biophysics is going to infiltrate other departments. Barring exceptional cases such as we have discussed this morning, this may be the only way in which many schools can keep ahead in physical science. Circumstances must determine where and how the now essential teaching takes place.

DR. W. E. BROWN (University of Vermont): Biophysics is going to get into our curriculum, no matter what we do, and I am not concerned whether it comes into physiology or whether it comes in as a separate department. But one thing is certain. At the present time our students enter medical school with very inadequate training in physics. If you go over applications, you will find that many of your students who are B or B plus, or even A students, will have a C in physics.

There are various explanations for this. Some students go to institutions where the course in physics is a real course, and many of them get a C. I talk with such students, and find they have no mathematical background to handle such a course. In other instances, the institution adapts itself to the fact that physics is required for admission to the college of medicine. What do they do? They really bypass physics and give a sort of listener's, or survey course in physics, since most students do not have an adequate background in mathematics.

The matter is now up for discussion between our university and the medical school, whether we shall give a soft course in physics, or whether we shall insist that the premedical student take the regular course in physics.

In my opinion, one of the great weaknesses of the medical profession is its failure to have the tools for quantitative thinking. We show it in much of our medical work. It results from the fact we do not give our students enough mathematics. I do not feel a student has to be an expert in physics in order to get into any medical school, but I do feel he should have enough mathematics to enable him to take a real course in physics. I'm equally sure he will bungle biophysics if he undertakes it without adequate preparation in physics.

Teaching of Neurology*

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I might preface my remarks by saying that I am a full time teacher, and my interest in the teaching of neurology is primarily that of an educator, and one who is concerned with pushing forward the frontiers of medicine. Let me, first, indicate my conception of a neurologist. To me, he is a physician especially interested and trained in neural form and function in health and disease, regardless of part or pattern.

This is an inclusive view of a neurologist, and I wish for the sake of clarity to break it into its parts. First of all, he is a physician, by which I mean that he has a belief in man and is willing to be responsible for him. This is another way of saying that a man must have a "heart for it."

When I refer to special interest and training in neural form and function in health and disease, it is implied that the neurologist's role is often that of defining and using what is left after certain damaging circumstances have destroyed part of the nervous system. He must appreciate the wide range of healthy function. Without a fundamental grasp of integrative functions and the structures involved at all levels, he becomes inadequate to his task.

And, finally, when I include "regardless of part or pattern," I would like to call attention to the fact that the neurologist is often too narrowly conceived as having to do with defects in motility and sensory function alone, and one who leaves out of consideration patterns of reaction and behavior which individuals exhibit during stress. These include smooth muscle and gland functions; he must deal with the fact that the stomach, during periods of stress, is reacting, in part, to impulses brought to it by the vagus nerve; that impulses via the superficial petrosal nerve may be important to nasal occlusion in individuals during conflict. His interest carries him into the appraisal of behavior pattern disturbances in mentation and personality function and social deportment.

The neurologist should define his place in the medical school family at four levels: First, in terms of the undergraduate. He should make the undergraduate aware of the relevance of his knowledge of neurology to all departments of his medical experience. The teacher does this also by interesting members of the faculty of the various departments of the school. A practical demonstration of such an interest would be the investigative activity in problems involving neurology of the workers in obstetrics, gynecology and surgery, for example, and as an outgrowth of curiosity aroused by the interest, the ultimate publication of completed work.

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He must be interested in the house staff so that the physician who completes his training in the hospital to which the neurologist is attached lacks the frightened ignorance about neural function which is so common in communities where this discipline is undervalued.

Then, he has a role in creating a limited number of teachers and investigators. Also he has a part in creating the needed number of specialist practitioners.

What is the problem in terms of the community or service aspects of the neurologist? Though statistics are weak, it would be fair to say, from a survey at the New York Hospital, Bellevue Hospital in New York and St. Bartholomew's Hospital in London, that from 12 to 14 per cent of patients who are admitted to general hospitals have structural defects of the nervous system, not necessarily irreversible or fatal. If we take the United States population studies for 1930 and divide the topic up into parts, we come out with a total of 163,408 deaths from diseases of the nervous system, in terms of 1,146,662 total deaths, or about 14 per cent of the individuals who die in a year have some structural disorder of the nervous system. These figures have been revised for 1946, and in terms of the larger population they are approximately the same.

Of course, this is only part of the problem, and, I think, less than one-half of the problem.

What is being done about the teaching of neurology? In 1946 Dr. Henry Alsop Riley made a survey of the medical schools as regards the teaching of neurology throughout the country.

STATUS OF NEUROLOGY IN THE MEDICAL SCHOOLS OF THE U. S. A.
64 ANSWERS FROM 69 SCHOOLS.

	1946	Established Before 1923	Established Since 1923
Schools with no neurological representation.....	4		
Schools with neurology as a division of medicine.....	6		
Schools with independent neurological departments.....	13	8	5
Schools with combined neurological and medical departments	15	9	6
Schools with combined neurological and psychiatric departments	21	19	5
Schools with combined neurological, psychiatric and medical departments	2	1	1
Schools with combined neurological and neurosurgical departments	1	1	
Schools with combined neurological, psychiatric and neurosurgical departments	2		2
Schools with recognized neurological departments but combined with other departments	41	24	17
Schools with independent or combined neurological departments	54	32	22

In other words, there is neurologic teaching in most of the schools of the country. However, there are several defects at the moment. In the first place, there are too few teachers; second, neurology is conceived of too narrowly. Third, the teaching is too didactic. And fourth, there is too little bedside teaching in which the student assumes responsibility for the implications of his examination.

At the Cornell University Medical School during the last sixteen years,

we have tried to face some of these problems and to arrange our teaching accordingly. The philosophy of the teaching in neurology is simple. Since skeletal muscle is so largely dependent on neural function, it becomes an important indicator of neural disorders; hence, tendon and surface reflexes play an important part. Smooth muscle and gland structures are integrated into reaction patterns during life stress. Such disturbances, as well as those in mentation and personality function, may result from brain tumor, conflicting goals or adverse life situations.

With these matters in mind, then, we have taken on the four functions of the neurologist in the university community. Starting at the undergraduate level; during the first year at Cornell, the student receives, through the department of neuroanatomy, an intensive training included in 91 hours in the form of the nervous system. Also during the first year, he is exposed to 36 hours of neurophysiology offered by the department of physiology, and 33 hours of neuropathology, given by the department of pathology. With the exception of a few demonstrations, there is no bedside work during the first year.

During the third trimester of the second year, the student receives bedside training in "neurologic diagnosis" at approximately the time he is being disciplined in "physical diagnosis." Each two pairs of students have one instructor throughout the periods. The teacher is not especially concerned with the natural history of disease, but only with methods of eliciting the evidence of dysfunction of the nervous system. The student describes his observations in a meticulous manner in a written protocol which he submits after each patient is examined for review and correction. He examines in all from 12 to 24 patients, 12 of his own, and 24 in combination with his partners.

During the third year, emphasis is placed on the natural history of disease of the nervous system, and, during three weeks of his clinical clerkship in the medicine trimester he spends his working day with neurologic patients. He assumes the responsibility of writing the history, and the results of his examination after revisions become a part of the permanent protocol of that patient. Such responsibility is a necessary part of neurologic training. Bedside teaching, seminars and discussions are focused on patients with neurological disorders in a manner similar to that which is carried out on all medical patients in the university hospital.

During the fourth year, he spends two three-hour periods each week during one month with patients with diseases of the nervous system in the outpatient department. The emphasis is now on the management of patients with disease of the nervous system. The student is the first to examine the patient. He takes a history, performs an examination and arranges the management. He is supervised by a tutor. His notes after correction and approval become part of the permanent record of the patient.

At the house officer level, the New York Hospital is so organized that interns and assistant residents in the department of medicine spend approximately two months in a year in training with a group of patients who have

structural or functional defects of the nervous system. Thirty patients are collected on one pavilion closely associated with the neurosurgical service. This gives a broad view to the medical trainee. One finds that his attitude is wholesome and unassuming, simple and straightforward, and not one, as I mentioned before, of frightened ignorance, which is so hard to overcome.

The training of teachers, the third part of the program, is integrated in a six year program based on three years of general medical training, followed by opportunities to pursue investigative problems and study intensively patients with diseases of the nervous system. There is included one year of training in the understanding and management of patients suffering primarily with disturbances of personality function and mentation.

Finally, by incorporating the opportunities presented by the Veterans Administration Hospital at Kingsbridge and by Bellevue, a large city hospital, it is possible to train not only teachers, but also a suitable number of specialist practitioners who have had at least three years of training in the university hospital.

It is hard to evaluate the effectiveness of a teaching program as I would like to do now at the end of sixteen years of experience. From what I can learn of our graduates, both at home and abroad, they act in a manner that is sound, sensible, comfortable and reasonable toward the problems of disease of the nervous system, and approach them with as much confidence and common sense as they do problems of the chest, stomach or kidney. Nor, do they shrink from dealing with life problems or disturbed personalities.

The effect of the program on university life is provocative. One of the indications of its wide usefulness is noted in the kind of studies that have come out of this effort. In sixteen years, we have accumulated about seven sizable monographs on problems of major clinical interests based on about 400 publications. Most of them represent the results of cooperation with other departments of the university.

During this period, a total of twenty physicians have had close association with the departmental program in their training for medical teaching. All but three of these have university appointments and occupy important posts. Nine of these are engaged on "full time" status. Seven have rank of professorial grade. The recently incorporated Kingsbridge Veterans Administration program in affiliation with the Cornell University Medical College has already yielded three teachers of promise who are about to be accorded university titles.

In addition the affiliations with Bellevue Hospital and the Kingsbridge Hospital have supplied the community with a sizeable number of specialist practitioners.

I suggest that this orientation, which is, perhaps, broader than many would accept as included in the teaching of neurology is, nevertheless, one which a full time teacher might find useful. I believe it has been a profitable orientation for our own medical center.

DISCUSSION

Dr. Lewis J. Pollock (Northwestern University Medical School): When the opportunity for teaching neurology is afforded to a department of neurology, no great modification of the curriculum described by Dr. Wolff is necessary. I wish, however, to present to you the picture of whether such opportunities are available in the medical schools of the United States.

In preparation for his Presidential Address to the American Neurological Association, Dr. Henry Alsop Riley made a study of the status of neurology in the United States. As chairman of a Committee on Public Relations of the American Neurological Association, I have continued to study the status and to extend it.

Employing some of the data included in the replies to Dr. Riley's questionnaire, certain facts became evident to me. It was revealed that there were 711 neurologists participating in teaching in the medical schools. When one added the men teaching in the schools of Massachusetts, New York, Pennsylvania, Maryland and Virginia, there were 363, or 52 per cent, of the whole number in the United States. In New York state alone there were 28 per cent of all of the teachers in the United States. For the New England and adjacent states, comprising Maine, Vermont, New Hampshire, New York, Massachusetts, Connecticut, Rhode Island, Pennsylvania, Maryland, Delaware and the District of Columbia, there was one neurological instructor per 114,000 of population. For the Southwest, comprising Oklahoma, Arkansas, Texas and Louisiana, there was one instructor for 198,000 of population. For the Midwest, comprising Minnesota, Wisconsin, Michigan, Ohio, Indiana, Illinois, Iowa and Missouri, there was one instructor for 225,000 of population. For the Mountain and adjacent states, comprising Montana, North Dakota, Wyoming, South Dakota, Colorado, Nebraska, Kansas and New Mexico, there was one instructor for 296,000 of population. For the Pacific and adjacent states, comprising Washington, Oregon, Idaho, California, Nevada, Utah and Arizona, there was one instructor for 393,000 of population. For the Southeastern Seaboard and adjacent states, comprising Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Mississippi, Alabama, Georgia and Florida, there was one neurological instructor for 769,000 of population; excluding Virginia there was one instructor for 3,412,000 population. It may be said that only seven of twelve medical schools responded to the questionnaire. However, in a more recent questionnaire with eight schools responding, including Virginia, there was one instructor per 560,477 of population and excluding Virginia there was one per 1,404,999 of population.

It may be said that such disparity may be related to the numbers of medical schools. Although in some instances this is the case, in general it is not. Thus, in the New England and adjacent states responses were obtained from eighteen schools. There were in these schools 363 instructors or an average number of twenty per school. In the Southwestern schools, six in number, there were seventy instructors or an average of 11.6. In the Midwestern schools, in fifteen there were 172 instructors or an average of 11.4. In the Pacific and adjacent states, there were five schools and thirty-nine instructors or an average of 7.8. In the Mountain and adjacent states there were four schools and twenty-three instructors or an average of 5.7. In the Southeastern Seaboard and adjacent states there were responses from seven schools. There were thirty-six instructors or an average of 5.1. Exclusive of Virginia there were five schools, eight instructors or an average of 1.3.

In a more recent survey with eight schools reporting, there were forty-eight instructors or an average of 6. But excluding Virginia there were seventeen instructors in seven schools or an average of 2.4.

It is natural to find that in the New England states where medical education developed earlier and more intensively and where the wealth of the states is greater, that here would be concentrated the greatest development of the teaching of neurology.

Were it true that from this rich source of teaching, the products would be distributed to all other parts of the United States proportionate to the population and if the product was of sufficient size to serve the country, the source of the product would be immaterial. What is revealed is that in the very states where the teaching of neurology is represented by the fewest men, the extent of practice of neurology and the opportunities for the advancement of this specialty are minimal. This unequal distribution graphically points to the need of an overall survey which may lead to an understanding of the status of neurology, its needs, and the means by which they may be met.

In this connection, it is of interest to note Clarence Mills' article in the February issue of *Science* upon the equity and wisdom in the distribution of Federal research funds. Remarking that there is no evidence that native intelligence is better in one part of the United States than another, he goes on to point out the dominance of the older institutions in the Eastern Seaboard which contains less than 30 per cent of the total population, yet receives from 50 to 80 per cent of all research funds; thus 66.7 per cent of the American Cancer Society's funds, 58 per cent of the John and Mary R. Markle Foundation Funds, 74 per cent of the Commonwealth Fund, and so on.

Since in these states there is a far greater proportion of teachers of neurology, it would appear that in order to obtain more research funds it will become necessary for institutions elsewhere to provide a greater number of instructors in neurology.

There is, however, another interpretation and that is, that for the dearth of neurological teaching and for the inequality of distribution of research funds there may be a reason common to both. For the latter, as Mills has said (*Science*, October, 1948), "No thoughtful person would doubt that the states of the Northeastern Seaboard do possess superior facilities and personnel for research," and I would further point out their greater wealth, greater age and experience, their location in a relatively densely populated area, all contribute to their ability to afford opportunity for the teaching of neurology and its support in research and hospital practice. Only from these could evolve a curriculum as presented by Dr. Wolff.

One may, I think, profit from the circumstances that in this area held to be most favorable for research grants, that not only is neurology recognized as an important specialty but it is amply represented in faculties, curricula, research and hospital practice.

What of the other parts of the United States? Recently another inquiry has been made of neurologists in medical schools and in practice. Dr. Riley directed his inquiry to the Eastern States, Dr. Walter Schaller to the Western States. Both of them employed a questionnaire. I requested a long letter; this resulted in a far more clear picture, although more difficult to analyze.

My part of the survey included the following states: Michigan, Wisconsin, Minnesota, Illinois, Indiana, Ohio, Kentucky, Tennessee, Iowa, Oklahoma, Arkansas, Missouri, Louisiana and Texas. From the many replies to my inquiry and to the full content of the replies, certain broad conclusions may be reached.

Among the medical schools there is no uniformity of organization; at times neurology is independent; at times a part of a department of neuropsychiatry; rarely the chairman being a neurologist, usually a psychiatrist; at times it is a part of neurology and neurosurgery, a neurosurgeon being the chairman; at times it is a part of a division of medicine and a psychiatrist the chairman of neuropsychiatry.

There is no uniformity of the philosophy of teaching neurology, none as to the necessary curricular hours, or cooperation with departments of anatomy, physiology, pathology, etc. The curricular hours, even fattened by pride in many cases, are too few. In general, with the exception of large state universities or others with either full time faculties or large hospital facilities, neurology does not prosper under a chair-

man of either a psychiatrist or other specialist. In a number of states and some schools of other states, the numbers of well qualified neurologists on the teaching faculty is pitifully small. In a large clinic with full time faculty, or large university hospital with a large number of service beds, neurology enjoys the same privileges as do psychiatry and neurosurgery. In other hospitals the activity of the neurologist often is submerged by medicine, orthopedic surgery, pediatrics, neurosurgery and psychiatry.

Again, with the exception of a few large institutions, facilities and appropriations for research are largely denied to neurology. In very many instances the prevalent wave of overemphasis on psychiatry, psychodynamics and psychosomatic medicine makes them the favorites for development. In general, although there are a number of exceptions, neurology is not held to be an important part of undergraduate education. However, from all responsive replies of 42 medical schools, in 37 it was said that there was an active student interest reflected by attendance, requests for more teaching, numbers of graduate students, requests for special internships, voluntary student conferences and student neurological societies.

To justify any recommendations concerning the improvement of the state of neurology in medical schools, it is necessary to show that neurology is one of the most important branches of medicine. It would be impertinent of me to attempt so to persuade you (and if it is necessary to persuade you, time would not permit). Neurology is a branch of the art of medicine which is based on sciences which must devotedly and continuously be studied by its practitioners to an extent not possible by any hybrid combination or other substitution. The cause and cure of many disorders of the nervous system remain to be discovered. They can be discovered only by those whose special training in neurology is built upon the cornerstone of undergraduate medical education. I can, I feel, leave to you the implementation of what my remarks suggest.

DR. R. HUGH WOOD (Emory University): We follow the general plan of teaching neurology as outlined by Dr. Wolff. I find myself wondering as to the method by which Dr. Pollock obtained his statistics. We have two qualified neurologists at Emory. These men are diplomates of their specialty boards, and have had five or six years' graduate training. They are part time clinical teachers, but there must be other neurologists in Vanderbilt, Duke and other southeastern schools.

DR. C. D. LEAKE (University of Texas): It would seem that accumulative experience in medical teaching has shown the wisdom of combining neurology with psychiatry, since the bulk of our schools have that combination. Certainly, it would seem that neurology provides an exceptionally fine balance wheel for the intuitive imaginings of psychiatry.

With regard to the non sequiturs which Dr. Pollock stated, it is hard to tell how many of those were thrown at us with irony, and how many were unconscious on his part. I think many other conclusions might be drawn from the statistics he offered than those which have actually been mentioned.

One of the important points in the relation of neurology to psychiatry is in the gradual accumulation of objective and verifiable scientific knowledge with respect to the functioning of nervous tissue including the brain. The conference on cerebral function held in September in Pasadena illustrates, it seems to me, the way in which neurology will certainly dominate the picture that is now included in psychiatry.

I see no reason whatsoever for neurologists to be worried about the future development of their field.

DR. LEWIS J. POLLOCK: Of course, Dr. Riley obtained his data from replies to the questionnaires he sent to the medical schools of the United States. Generally people are indisposed to reply to questionnaires. Nevertheless, from the replies to question-

naires the figures, as I have read them, were derived. I have no fear for the future of neurology. It will continue to exist for a great many centuries. I am nevertheless concerned with its development. I feel we need more neurologists in teaching, in training, in research and in practice. I agree that there are marvelous fields ahead in research. I do think there is a disparity between the position of neurology in the Mid-western states, which area I personally canvassed, and the Northeastern seaboard. In fact, in one medical school of a great university the faculty in neurology consisted of one professor and one resident. The curricular hours were so pitifully few that it would be impossible to learn how to utilize the knowledge derived from devoting one-fourth of the time of teaching anatomy to the nervous system.

DR. HAROLD G. WOLFF (Closing): Having defined the subject as I did, I felt that there would be no occasion to deal with the problem of psychiatry versus neurology. These, I think, are local problems to be solved in terms of personalities and interests. At the moment, there is a great interest in the dynamic aspects of psychology. This is exerting a very important influence in teaching and in treatment, all of which I look upon as good.

I feel that the ultimate integration of such knowledge with that which will be forthcoming through other, and perhaps more experimental, procedures will ultimately give us a discipline which will be quite different from that which we have at this moment.

I hope to leave the impression that the general structure I have indicated excludes no aspect of investigation or thought, but perhaps prepares, as well as we can at the moment, a student to take on, according to his taste, opportunity and temperament, one or another aspect of the broader problem of neural functions as manifested in behavior, as well as in the less complicated aspects of disease of the nervous system.

Freshman Anatomy As a Correlated Course*

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Most people would agree that the acquiring of isolated facts is much more difficult and much less worthwhile than the acquiring of the same facts when they are integrated into a logical and meaningful total picture. As the result of this feeling, there has been a great deal of interest among medical educators in the question of correlation, and there have been a considerable number of papers dealing with the correlation of all of the subjects in the medical curriculum as well as correlation on a more limited scale.

It is about six years since the last paper, with which I am familiar, was presented on the correlation of the phases of anatomy. Because of this fact, and because we have now had five years of experience at Temple University School of Medicine with the presentation of freshman anatomy as a single correlated course, it seems worthwhile to discuss such a program again. The word anatomy is used here to include all of the phases of the study of the structure of the human body; that is, gross anatomy, microscopic anatomy or histology, developmental anatomy, including embryology, and neuroanatomy.

When a few years ago I was given the opportunity of organizing the work in anatomy, I had already decided that I would like to try a correlated course for the freshman. The job of organizing the work was made definitely easier by the willingness of Dean Parkinson to block a certain number of hours for anatomy per week and to allow the department to schedule lectures, discussions, time in the gross laboratory and time in the micro laboratory at different periods during the anatomy time depending on what arrangement of work on the particular day made for the best sequence of material. On some days we may have as many as three lectures and on other days no lectures at all. Sometimes we are in the gross laboratory for several days in a row, only going to the micro laboratory when we come to structures which have not already been studied microscopically.

Another point of interest in connection with the planning of our course is that it was planned without first looking into the literature concerning other correlated courses in anatomy, as is usually done when one is approaching a problem. This procedure was followed as it was felt that there might be more chance of having a fresh approach in this fashion.

The correlated course in freshman anatomy which I am about to describe is the result of the original planning plus five years of evolution into which many suggestions of the entire staff have been woven.

Outline of the Temple University Correlated Course in Anatomy.—The course in freshman anatomy as carried out at Temple University School of

*Read at the Fifty-ninth Annual Meeting of the Association of American Medical Colleges, held at White Sulphur Springs, W. Va., November 8-10, 1948.

Medicine runs throughout the first year, occupying the students' time for $3\frac{1}{2}$ days a week during the first semester and 2 days a week during the second semester. This time amounts to about eighty-eight 7 hour days. The class is divided into groups of from 20 to 25 students and there is a staff member in charge of each group who is with the group in all of the phases of the work. Each group has the guidance of each staff member for a portion of the year.

The first seven days of the course are given over to an introductory period during which time an attempt is made to familiarize the students with the kinds of structures which they will encounter almost as soon as they begin dissection and throughout the entire body. Early development is also covered in the introductory period. Table 1 gives a list of the structures and subjects to

TABLE 1.—INTRODUCTION (7 DAYS).

Kinds of Structures Encountered Throughout the Body.

CELLS—basic concept of cells, cell structure, cell division.

FASCIA—fibrous connective tissue in general, areolar connective tissue, adipose tissue.

BONES

MUSCLES (SKELETAL)

BLOOD VESSELS—general introduction to cardiovascular system, first contact with smooth muscle, endothelium.

CIRCULATING BLOOD

LYMPHATIC VESSELS AND NODES—general organization of lymphatic system.

NERVES—general introduction to nervous system.

EARLY DEVELOPMENT—from zygote through somite formation, development of body form in general.

INTRODUCTION TO ANATOMY AS REVEALED BY THE ROENTGEN RAY (including basic X-Ray physics).

which the students are introduced. The intention is to sufficiently familiarize the students with the general concept, and the gross and microscopic appearance of these structures so that they will mean something as they are come to in dissection. In looking through this list, it will be seen that there are several general considerations from the standpoint of systematic anatomy which have not been included. These general considerations are taken up at the time that the first representative of the apparatus or type of structure is encountered in the process of dissection.

In the remainder of the work in our course, a complete dissection of the body is the basis for organization of the program. The body is dissected by regions and, as each structure is encountered, it is studied from the gross, microscopic and developmental points of view, if the microscopic anatomy and general development of the structure have not been previously considered.

This general plan can be amplified by comments on what we do regarding the major phases of anatomy and other minor approaches.

GROSS STUDY

The dissection is guided by a detailed outline of dissection directions in mimeographed form.

MICROSCOPIC STUDY

There is no attempt to give an organized course in histology. That is, we do not start out with the classification of tissues and then proceed to the study

of the structure of organs, but we study the microscopic structure of each thing which we come to in dissection and learn the tissues as we are introduced to them by finding them as constituents of the gross structures which we are studying. By the time the student has progressed very far in the course, he has acquired a knowledge of all of the "fundamental tissues." We make some attempt to have the student study material from his cadaver under the microscope.

DEVELOPMENT

The early development as considered in the introductory period of the course brings the new individual up to a stage from which development of any of the organs or organ systems can be taken up, and an effort is made to impress upon the student that developmental anatomy is more than just embryology.

NERVOUS SYSTEM

A good deal of the study of the nervous system is carried out by taking up material concerning this system at various places where it can be tied in throughout the work in dissection. For example, there is the consideration of functional components in connection with the first nerves which are dissected; the consideration of columns of cell bodies in the spinal cord in relation to the innervation of the upper extremity; and the consideration of the columns of cell bodies in the brain stem in connection with the dissection of the cranial nerves.

OSTEOLOGY

The bony framework is taken up by "bone assignments" of the bones forming the framework for the region being dissected at the time when the student needs to know the general landmarks on the bones for his study of the region. Various muscle attachments and relations to soft tissue are added to the general descriptions of the bones as these structures are studied.

CROSS SECTIONS

Cross sections are studied in connection with the study of the region.

X-RAY STUDY

The Department of Radiology gives fluoroscopic demonstrations of the thoracic and abdominal viscera at appropriate times, and our very cooperative professor of radiology allows us to schedule his lectures describing anatomy as revealed by the roentgen ray at the times that these descriptions fit into the program best.

SURFACE STUDY

The study of surface anatomy is used mainly in connection with the summarization and review of the region.

CLINICAL MATERIAL

A clinic is presented to the freshman students on one day each week and the clinician in charge makes an attempt to choose a case which exemplifies the use of the knowledge of anatomy, chemistry or physiology which is being acquired at that time. The clinical importance of structures is alluded to as they are discussed in the work in anatomy.

Table 2 shows the order in which the regions are taken up, the amount of time allotted to the study of each region and the considerations which are included with the region which would not be obviously included there according to the general plan of approach which was outlined earlier.

TABLE 2.—SEQUENCE OF REGIONAL STUDIES.

BACK (8 days) General study of skin, general introduction to joints with those of vertebral column as examples, functional divisions of the nervous system.
SUPERFICIAL NECK AND AXILLA (3½ days).
THORACIC REGION (9 days) General introduction to respiratory apparatus and to digestive apparatus.
UPPER EXTREMITY (8 days) Bone development with humerus as example, nerve degeneration and regeneration, gray matter of spinal cord with special reference to upper extremity, spinal cord reflexes.
HEAD AND DEEP NECK (21 days) Columns of cell bodies in brain stem related to the functional components of the cranial nerves, cranial nerve reflexes.
CENTRAL NERVOUS SYSTEM (10 days) Primarily study of pathways related to gross and microscopic landmarks. (Students are taking neurophysiology at this time also.)
ABDOMINAL REGION (7 days).
GENITALIA, PERINEAL AND PELVIC REGIONS (7 days) Fertilization, implantation and placenta formation with female genital structures.
LOWER EXTREMITY (8 days) Review study of the microscopic anatomy of types of structures in the lower extremity, blood formation.

The only comments which I will make concerning the order in which the regions are taken up are that the back is dissected first so that the spinal cord and the emerging spinal nerves can be seen very early in the work; and the thoracic region is studied early so that the heart and major blood vessels can become part of the students' personal experience.

TABLE 3.—A SAMPLE WEEK'S SCHEDULE.

6th Week. Schedule for Freshman Anatomy. 1948-1949

MONDAY, OCTOBER 25

9:00-9:45 Lecture: "The Pleura."

9:45-1:00, 2:00-4:15 (Bone assignment: The sternum and ribs.) Dissect typical intercostal spaces; without damaging parietal pleura, take off the first five ribs and related part of sternum; internal mammary artery; dissect and examine pleura.

4:15-5:00 Lecture: "The Subdivision of the Lung on the Basis of Bronchial Distribution (including introduction to the respiratory apparatus)."

THURSDAY, OCTOBER 28

9:00-10:00 Lecture: "Development of Bronchi and Lungs."

10:00-1:00, 2:00-4:15 Dissect and examine thymus; examine lungs, relate them and their fissures to bony framework, note relations to mediastinal structures as shown by impressions on lungs; dissect roots of lungs and remove lungs by cutting structures forming the root.

4:15-5:00 Lecture: "Microscopic Structure of the Bronchi and Lungs."

FRIDAY, OCTOBER 29

9:00-12:00 Microscopic study of thymus, bronchi and lungs.

1:00-3:00 Dissect out bronchial tree far enough to demonstrate "segmental bronchi."

3:00-4:00 Lecture: "Anatomy of the Pleura and Lungs As Revealed by the Roentgen Ray."

4:00-5:00 Discussion in groups of pleura, lungs and bronchi.

SATURDAY, OCTOBER 30

9:00-10:00 Lecture: "Pericardium, Mediastinum, Remnants of Foetal Circulation."

10:00-1:00 Dissect and study superior vena cava and its tributaries and the arch of the aorta and its branches.

Table 3 is an example of the scheduling of one week's work in Freshman Anatomy modified from the mimeographed schedule given to the students by omitting the rooms in which the classes are held and omitting the names of the members of the staff who are giving the lectures, and by stating very briefly the material to be covered in dissection which is assigned on the students' schedule by reference to numbered dissections in the "Outline of Dissection Procedure."

Comparison of the Temple University Course with Other Correlated Courses.

—Obviously there must be a good deal of similarity in all single correlated courses in anatomy since by nature they must all have the same basic concept, which is elimination of the boundaries between the subdivisions of anatomy and consideration of all structures from gross, microscopic and developmental standpoints as they are taken up.

No attempt will be made to give any detailed consideration of differences in the correlated courses in anatomy which have been and are being given, but I will attempt to indicate some ways in which the program we are following at Temple University differs. The introduction to our course differs primarily in the fact that we do not take up an organized discussion of tissues, but instead we attempt to give the student a general understanding of the structures which he will encounter on the first day of his dissection and throughout his dissection. It seems to us that from the practical standpoint, a doctor is interested in structures first rather than individual tissues.

In our course there is a much greater degree of integration of the consideration of the nervous system which material is well scattered throughout the course. This makes for a better understanding of the nervous system and its significance.

Another way in which our course differs from some and is similar to others, is that the organization of dissection (and hence the total study of the body) is on the regional basis rather than by systems. I shall not enter into a discussion of the relative merits of these two approaches since it is not a significant factor in the correlation of the phases of anatomy. This may be a very definite factor, though, when one is attempting to correlate anatomy with physiology and biochemistry which, however desirable, is out of the scope of this paper.

"Pros and Cons"

Next, I would like to point out what appear to be some of the advantages of a correlated course in anatomy. It has been my experience that the vast majority of individuals when considering such a course have the reaction that it is certainly a logical procedure. It seems to be a more natural approach to the problem of the structure of the body. The subdivision of anatomy into its phases is an academic artificiality. The natural approach upon encountering some new object is to look it over and, if possible, take it apart (gross anatomy), next to try to see the more minute structures by the aid of magnification (microscopic anatomy), and then to wonder how it got to be like it is (developmental anatomy).

Because of the logic and naturalness of the correlated approach, it definitely appeals to the students as has been demonstrated in our school by finding that all but two students out of a freshman class of 137 expressed themselves as favoring this program at the end of our last school year.

Although it is, of course, very difficult to check this impression accurately, the staff has the feeling that the students gain a better total understanding of the structure of the body by such a program.

As has been emphasized both by Doctor Hooker and Doctor Burns, such a course in anatomy is an excellent training for younger staff men. It also helps to keep even the more experienced staff members from getting too narrow a point of view.

There are few disadvantages and those which one might mention are of a minor nature.

1. A staff member who has been in the habit of being responsible for the teaching of a separate course in one of the phases of anatomy may find it difficult to enter into such a program where he feels that there is no "domain" which he can call his own.

2. In consideration of the size of the staff, it may be necessary to remind the administration that although one is presenting just one course to the freshmen, it actually represents what previously has been two or three courses each with a staff more or less of its own.

3. At the present time there is difficulty in finding enough men with a sufficiently broad training to help in the teaching of such a course.

4. It is necessary that laboratory space be available at any time that it seems advisable to schedule laboratory work.

Results of a Survey to Determine the Number of Schools Giving a Single Correlated Course in Anatomy.—In an attempt to find out how many departments of anatomy are giving a course somewhat similar to the one described in this paper, a letter was sent to each of the medical school departments of anatomy in the United States and Canada with a return post card printed with the following statement: "The Department of Anatomy of the (name of school inserted) School of Medicine does (does not) give anatomy to their freshman students as a single correlated course in which gross, micro, developmental and neuro anatomy are integrated."

It was hoped that this would be a more or less painless survey in as much as all that was required of the individual receiving the letter was to cross out either the does or the does not, sign the card and drop it in the mail box. However, those individuals who returned the cards with an affirmative answer were further bothered for details of their correlated programs.

The following is a purely personal evaluation of the material available, and must not be taken too literally as there obviously can be many interpretations as to degree of correlation which is being accomplished. There are five schools in addition to ours giving a single, highly correlated course in anatomy at the present time. Three of these, however, do not include neuroanatomy in the correlated program. There are four schools which, although they list separate courses in gross and microscopic anatomy, have their program so worked out that there is quite complete correlation in most parts of the work; fourteen schools indicated either by a note on the card or by a separate letter that correlation plays a very definite part in the planning of their program. There is at least one school where emphasis is placed on correlation of all of the first year subjects rather than the correlation of the phases of anatomy.

I am aware of the fact that there are schools other than this one where attention is being paid to the correlation of anatomy with material presented by other departments, especially neuroanatomy with neurophysiology, but I have no accurate data on this point. The remaining sixty-five of the schools contacted, did not indicate any further information than that they did not have a single correlated course in anatomy. I felt that it would be imposing too greatly on the time of the people involved to send a questionnaire which in any way would give an indication of the degree of correlation which was being attempted, but I am very sure that, in the majority of the sixty-five departments which sent a negative answer to my direct question, there is a great deal of correlation between the phases of anatomy in, at least, some parts of the work.

Apparently there is a very general interest in and realization of the value of correlation. The differences between the programs at the different schools depend, I am sure, upon a great many local factors as well as the degree of interest in the question of correlation.

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DISCUSSION

DR. H. W. ADES (Emory University): As an anatomist, Dr. Huber's paper interested me particularly, since it embodies the solution to some of the problems I have, but I think the implications of the correlated course in anatomy, well organized as this one is, go much farther than the teaching of anatomy. Of course, everybody knows how to teach anatomy more than any other part of the medical curriculum. I think everyone who has gone through medical school feels an overwhelming confidence in his own ability to decide what is good and what is not good practice in the teaching of anatomy. Unfortunately, these opinions are all different. But I think anatomy, because of its broad coverage, can be the model on which the entire medical curriculum may be reorganized. Anatomy covers so much that the principles which apply to the correlation of a course in anatomy can be applied to the entire curriculum of the medical school, and I think the paper has greater significance on that account.

DR. MONTAGUE COBB (Howard University): Although 400 years have elapsed since the publication of the Fabrica, and although Dr. Swett enumerated about 374 ways to teach anatomy in his bibliography published in your JOURNAL some years ago, I think the field might still be open, particularly as there is no agreement. I have been working along the same lines as Dr. Huber and recently had the privilege of showing him the results of our study. We came up with something a little different from perhaps a different approach. One of the greatest difficulties we have found with the freshman curriculum is that it embodies too much reading matter. The freshman shelf of texts is about two and a half feet long. We started by eliminating a dissecting manual

and an atlas as requirements. That left us with 1,500 pages of textbook, which is more book than any student ever read, even as a novel, before he got to medical school. Yet many of them still attempt to read the text through. By moving back to as primitive a level of intelligence as we could, we got to the upper paleolithic, where man was a good artist, although he had no language that we know of, or organized life in a modern sense. When a child starts to use writing implements, he draws pictures and does not attempt to make letters. So, starting with something as conservative and entrenched as the impulse to draw, we made self-drawn pictures the basis of our method.

We borrowed a canon of proportions from the Classical Greeks in the sixth century B. C., introduced ten points that have to be learned categorically, as a twentieth century contribution, and developed a technique whereby with a little briefing any adult human being can be taught to draw the human figure with the skeleton in it in forty-five minutes—perhaps fifty minutes for deans.

The premise is, that as a student can make as many tracings of such drawings as necessary, he may make his own textbook from day to day, as his dissection progresses. We have four years of class work now to prove that anybody can be taught to make such drawings.

As a universal frame of reference for the infinite details of anatomy, we use a scheme called "Master Keys to Anatomy," three phases of human development arbitrarily selected; the fertilized ovum, the seven-week embryo, and the erect adult. With this technique, we feel it possible to compress within 150 pages of plates, the contents of the average modern text in anatomy of about 1,500 pages. That sounds like Leonardo recommending himself, but we hope in the future to offer this plan for consumer judgment.

I should like to acknowledge how beneficial it has been to learn of Dr. Huber's procedures this morning. Apparently he has greater control over his faculty than we do, because the greatest difficulty in instituting a broad, integrated work we have encountered has been not from the student body, but from the mental "set" of the faculty.

DR. J. E. MARKEE (Duke University): We are continuing a correlated program at Duke which was initiated by Dr. Swett. Our program is somewhat different, and it includes the incorporation of visual aid very extensively without very many boundaries. We are bothered by one fundamental problem, however, and I would like to know what attempts are being made elsewhere to solve this particular problem. We are quite sure that we have to bring the patients into the picture very early. We have run a number of experiments in ways of bringing the patient in, but they were brought in sometimes by people from the various specialty groups. The freshman students see, almost from the beginning, the examination of at least two patients a week. We have changed that this year, and will probably continue to change it. I would like to know how we correlate the patients from the very beginning with a correlated presentation of all anatomy. That problem disturbs me a great deal.

DR. HUBER (Closing): Dr. Cobb's thoughts on teaching of anatomy are very interesting, and I think any of the techniques which we can employ, such as Dr. Markee's visual education technique, and all other techniques which will make material more readily assimilable by the student, are valuable. We ought to use as many of these teaching procedures as we can. In reply to Dr. Markee's question concerning clinical problems, we have made just a little start on that, and I think not differently from the way they have done at Duke. The freshman students get one clinic each week presented by a member of the clinical faculty. We work with him in telling him the material which is being covered in anatomy so that he can, if possible, pick out a patient which will exemplify a problem concerning the structure which the student is dissecting at the time. He also works to some extent with physiology and biochemistry, so there can be correlation between the clinical material and those subjects also. We are just getting a start on this, but I think there can be a good deal done in attempting to pick patients representing the material which is being studied at the moment.

Group Interviewing As a Method of Evaluating Applicants for Medical School*

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The inadequacy of our previous method of selecting medical students by scholastic standing, aptitude tests and cursory individual interviews has led us in the last three years to seek supplementary means of evaluation of applicants for entrance into medical school. The problem of selecting medical students is no different in principle from what it has always been. The current combination of shortage of doctors with a plethora of candidates has made the problem more acute and has made more urgent the need for reducing the number of failures in medical school and for improving the caliber of those who will be permitted to study medicine. We have felt pressure, in addition, from the reflection that we are actually selecting physicians, rather than merely good medical students. The Admissions Committee of the School of Medicine of Emory University has attempted to meet the problem, not only by more concentrated effort in studying the usual criteria, but also by the addition of a new factor, namely, the group interview; this is a modification of the group screening method used during the war in the Manhattan project.

This report is of a brief preliminary character because we still view the problems of medical school admissions, experimentally, in general, and with respect to the group interview in particular.

Three members of the committee met for forty minutes with each group of three applicants. The functional roles of each group were defined for the applicants at the beginning of the interview. They were told that the committee was to judge their capacity in relation to others in their group and those seen previously. It was explained that the students were to utilize the time in any way they saw fit and that taking the initiative was one of the criteria for judgment. They were also told that we understood they were "on the spot," but part of what we wanted to know was the way they reacted and their ability to produce in such a situation.

One of the committee explained its belief that the applicant's capacity as a person was, at least, as important as his capacity as a student since the goal is selection of good physicians and scholars rather than merely good students. As the discussion developed, the committee tried to deepen its level and to challenge the applicants to greater creative thought. Philosophical, scientific and casual topics seemed of almost equal value in revealing the applicant's capacity when in competition with a group and while "under fire."

*Read at the Fifty-ninth Annual Meeting of the Association of American Medical Colleges, held at White Sulphur Springs, W. Va., November 8-10, 1948.

Each member of the committee rated the applicants individually on an empiric scale and it became apparent that their summated clinical judgment or intuition was a valuable addition to the usual data. We canvassed the customary sources for information about each student such as college record, the aptitude test and the opinion of those of the college faculty who understood our problem. The interview rating was incorporated as an additional factor and a decision to accept or reject was made by the committee as a group. The use of the interview method is based on our conviction that the actual situation of the student in medical school and later in medical practice requires capacities and capabilities not disclosed by any of the usual methods of evaluation. These include the following concepts:

1. Knowledge is not enough; the doctor is constantly called upon to apply his knowledge to living situations.
2. He must have the capacity to function effectively even though under emotional stress.
3. He must indicate an ability to grow emotionally as well as intellectually.
4. Those we accept must have the capacity to think in relatively unique and unknown areas. Each patient the doctor sees may present such a problem.
5. The applicant should give evidence of a maturing motivation. Immature fervor or cold detachment may be equally dangerous.

The interview provides a situation which is one of real stress for the applicant. He is anxious about his chances of getting into medical school; he knows that the competition is keen. In our interview situation he functions as a part of a group and yet is competing within the group. At the same time, he is under the direct dominant power of the committee. His reaction to the dominance of authority can be used to help prognosticate his relationship with the faculty and his ability to use medical school in his own growth and development.

From time to time, it becomes necessary to force the pace in the interview since the situation is not inherently conducive to free expression. There are several techniques, one of which usually helps: (1) An applicant may be warned that he is failing to put himself across and the available time is passing; (2) the committee may express specific doubts about a student as a challenge to him; (3) a candidate may be requested to elaborate and face the implications of statements he makes.

The committee gains in several ways from interviewing a large number of applicants. It attempts to evaluate the various facets of functional capacity. We are suspicious of passivity or aggression to the committee and to his colleagues, cynicism or inflexibility, indifference or inadequacy. It is possible, within limits, to detect gross misfits in these areas. These would include the prepsychotic, the psychopathic personality, the severe neurotic and the emotionally immature. At the same time we accept some exceptional persons despite the realization that they may require psychiatric guidance during their student days.

Members of the committee have found that the group interview method has proved not only a valuable tool in selection of medical students, but a highly stimulating process in itself. This is quite a contrast to the boredom and sterility of the old method where each student was interviewed by each member of the committee for fifteen minutes. Moreover, we feel that certain qualities are brought out in the group situation which are never observed in the individual interview. Applicants have been called back on occasion for individual interview with one or more members of the committee, but these sessions have seldom revealed anything not discovered during the group interview.

The group method has had the additional positive effect of testing the opinions of one member of the committee against the others with the result that as the faculty group goes on interviewing, opinions seem to draw closer together. This may represent a defect of the method, but we feel it more likely indicates a closer agreement on the qualities desired in medical students and doctors. The discussion which takes place after each interview maintains the interest of the interviewers. It also serves to make more realistic the struggle to discover what it is we really want in medical students and doctors and how these qualities may be detected before the student enters medical school. It serves further to clarify the teaching objectives of the faculty by defining the qualities we wish to help the student develop during the next four years.

Several inadequacies of the method are already apparent. It is difficult to provide a clear functional definition of the situation so that either the students or the committee gets into action rapidly or accurately enough. There is a natural tendency to overrate or underrate the man who talks well or the person with high intellectual ability. It is especially difficult to discover in the time allowed, the psychopathic personality. Finally, it is not easy to evaluate the quiet man who is disinclined to parade his capacities.

CONCLUSIONS

1. The group interview method is a valuable added criterion by which the more objective data can be confirmed or modified. It cannot, of course, be used as the sole basis for admission.
2. Our confidence in the method has led us on occasion to accept applicants whose college records, for example, may not have been outstanding. Even more important, it has occasionally forced us to reject students presenting extremely high scholastic records.
3. The interview rating has often been decisive in singling out candidates for acceptance from a group not distinguishable, one from the other, on the basis of other criteria.
4. The method is particularly helpful as a means of judging students from schools other than our own on whom we have, consequently, no ratings by college faculty members personally known to us.
5. The group method has served to stimulate the faculty to more serious consideration of the selection of future doctors.

DISCUSSION

DR. TRAWICK H. STUBBS (University of Missouri): I jotted down a few things that impressed me in my two years' experience working with this committee, and I thought I might pass them on to this group. One of the most important things was that I came out of that experience feeling that we had moved a little way toward learning to think of the students as people rather than applicants. Usually, by the end of these conferences, we were six people sitting down talking together, and the faculty group had forgotten that these men were applicants and thought of them as people, and most of the time, the applicants had almost forgotten we were faculty.

I think that has important implications. If we are going to attempt to set an example for treating patients as persons, we must learn, as faculties, to treat students as persons.

Another thing that meant a great deal to me was the warmth of the faculty relationship that was developed, and not thinking about my colleagues as "Dr. Ades" and "Dr. Whitaker," but as "Harlow" and "Carl," and even about the Dean as "Hugh," instead of "Dr. Wood." That is getting a pretty nice degree of warmth in the faculty relationships, and plays a big part in developing a basis for mutual understanding.

Another point worth mentioning was that sometimes we hesitate to admit that this process of selection is, frankly, to a very large degree, a matter of subjective opinion. I think it is wise for us to admit that not only to ourselves, but to other people, and a "safety in numbers" approach to this problem may reassure us that we are not letting our personal bias and prejudice influence too much the exercise of this subjective element in our selection technique.

One other thing that I am anxious to try out that was suggested by this experience is an application of the same method to oral examinations with students by bringing faculty members from various departments together and sitting down and talking about specific subjects covered in the courses represented by those faculty members and seeing how much that can be an aid toward helping the student integrate his diversified studies, and also, helping the faculty move toward deeper mutual understanding.

The Young Physician Anatomist in Medical Education and Research

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Palpation of a patient's pulse is a difficult matter when done for the first time by a medical student. His examining finger must simultaneously check the peripheral arterial pulse rate, tension, rhythm and structural deviations in the vessel. Persistent study and practice are required to correlate his courses in physical diagnosis and clinical medicine with his sense of touch. In the same manner, a newcomer to the field of anatomical teaching and research finds it difficult to interpret the pulse of this science and to discern the factors which are operating today in the broader substrata of medical education and research in the associated basic sciences. Within a short period of observation and discussion, however, he soon learns that there are many interesting and stimulating factors at work which will eventually contribute greatly to the improvement of medical education in general and the teaching of anatomy in particular. This is a plastic, dynamic field, full of challenge to those engaged therein. It is used as the example, but with appropriate variations any of the medical basic sciences could have been cited.

The problem at issue in this presentation is: interesting young physicians in academic medicine, anatomy in particular. Because of the gap in the training of an adequate number of graduate students during the recent war years, a dearth of qualified younger men became acutely apparent in all basic science fields. Although some far-sighted professors and administrators were tending, before this time, toward the acquisition of more clinically trained anatomists, this situation emphasized their utility, if they could be found. It is obvious that they have not been found in adequate numbers. Much consideration has been given to the problem of granting greater financial inducement and security to capable and interested young physicians. The belief is current that, if the physician can be given recompense somewhat in the range of that which his clinical training could secure him in the practice of medicine, he would be more likely to be interested in a career in anatomy.

Certainly this is important. However, this is far from being the only factor at work. More fundamental problems are inhibiting promising, clinically trained, potential anatomists from entering the field, or are inducing them to leave it after brief acquaintance.

It is felt that the young Doctor of Medicine, on surveying the field of anatomy as a full time vocation, becomes daunted by the prospect of relearning and expanding his anatomical knowledge in the face of what is obviously known by his elders in the field. Even more important in his eyes is the greater knowl-

edge of research methods possessed by his contemporaries who have entered the field by attainment of the Doctorate of Philosophy in the Medical Sciences or Anatomy.

He is bewildered by the philosophy, methods and selection of research, about which he knows little due to their absence from formal clinical training.

He is disillusioned because he can see no immediate practical application of any research he may do as a neophyte, if he does manage to find a problem which interests him. It must be remembered that his whole education has been focused upon one goal, best expressed by Edward Livingston Trudeau, "To cure sometimes, to relieve often, but to comfort always—this, after all, is the physician's job."

He is discouraged because there is so much emphasis on so-called "fundamental or pure" research in which he is often not interested, or in the presence of which he feels inadequate because of insufficient research training.

Might it not be that these problems are more important than the matter of financial gain? Though few, perhaps, there are still men and women in practice (and many more now in the schools of medicine) who are fitted by personality and interest for academic medicine and who are willing to take the lesser income. They will probably not be reached until they can be made to feel that there is a particular, needed role for them. It must be one which will challenge them just as much as bringing comfort or cure to the ill; one which will stimulate them to overcome defects in their training; and one which will ultimately spur them to clinicoanatomical research joined with dynamic teaching of anatomy based on a background of clinical experience.

Once the anatomist-surgeon played a great role in medical education. He now has given way to the superspecialist in anatomy, just as the general practitioner at one time was giving way to the clinical specialist. Many efforts are being made today to restore the general practitioner to his previous status. Similarly, the plea is sounded herein for a return to the clinicoanatomical union as a means of advancing the field and attracting capable men and women to it. Just as much as outstanding trail blazers in fundamental research, we need opportunities for anatomical utility men who know by experience what in the vast encyclopedia of anatomy is important clinically, who can carry on clinico-anatomical research and interpret the maze of anatomy to their fellow clinicians. This should not be construed as lack of appreciation for the Ph.D.'s or fundamental researchers. Anatomy can not advance without these highly trained contributors.

This problem can be reduced to the question: What is the role of the young physician-anatomist in medical education and research? Hoping to stimulate discussion by others and, therewith, gain for all, the following are suggestions for consideration.

1. That heads of departments and others concerned give consideration to

revamping their departmental organization to include opportunities for interested young physicians to investigate this field of academic medicine.

2. That such opportunities be granted with sincere and sympathetic guidance reinforced by an adequate salary befitting the qualification of the M.D. degree. Lack of experience in the techniques of anatomical teaching and research is not a valid reason for granting only a submarginal teaching fellowship or assistantship to the individual whose attainment of the M.D. degree endows him with potentialities not possessed by the usual teaching fellow.

3. That such customary procedures as insistence on work toward the Ph.D. degree and much of the academic discipline and formalities be dispensed with entirely or, at least, laid aside until the individual desires to assume them.

4. A suggested program for a young physician interested in clinicoanatomical teaching and research could include the following:

A. ADVANCED EDUCATION

1. Evaluation and expansion of anatomical knowledge.
 - (a) Basic anatomical courses.
 - (b) Applied Surgical and Regional Anatomy.
 - (c) Advanced studies in any of the basic fields.
 - (d) Review and Advanced Scientific Languages; Scientific Writing; Library Resource Techniques.
2. Guidance to an understanding of good research methods.
 - (a) Individual conferences or seminars.
 - (b) Observation and participation in current departmental research.
 - (c) Reading of classical and current literature in a field of interest.
3. Development of a philosophy of science and medical education.

B. PARTICIPATION IN THE ROUTINE STUDENT TEACHING OF THE DEPARTMENT

1. At first assisting in laboratory and section teaching.
2. Then, soon, full responsibilities in teaching. Too many promising younger men are submerged too long as the "chief's assistants."

C. OPPORTUNITIES TO LEARN WHERE CLINICOANATOMICAL RESEARCH IS NEEDED. THIS MEANS AN INDIVIDUAL ATTEMPT TO CORRELATE BETWEEN THE LABORATORIES AND THE WARDS.

1. Attendance at hospital ward rounds, but no actual hospital duties.
2. Attendance and participation in clinical conferences, seminars, and meetings.
3. Time to read and abstract from clinical journals. Every opportunity should be granted for the maintenance and furthering of clinical interest. Otherwise the young physician-anatomist can so direct and engage himself in the job of becoming a laboratorian that he all too soon forgets his clinical training or becomes sadly out of date.

D. THEN THE FACILITIES SHOULD BE MADE AVAILABLE FOR THE PERFORMANCE OF RESEARCH.

1. Guidance in selection is important so that the newcomer doesn't unknowingly head toward a "stone wall" or "up a blind alley."
2. Matters of technical assistance and adequate budget should be readily granted. It is far too easy to tell the newcomer to do his own technique or scrape along with inadequate equipment and little financial support "for the good of his academic discipline."

E. THE OPPORTUNITY TO "TRANSLATE ANATOMY FOR CLINICIANS" VIA WRITING AND SPEAKING SHOULD BE OPEN.

F. HE SHOULD BE ENCOURAGED TO TAKE PART IN THE ADMINISTRATION OF THE DEPARTMENT AND MEDICAL EDUCATION IN GENERAL. THIS SHOULD BE EXPECTED OF AN INDIVIDUAL WITH THIS BACKGROUND.

It is not felt that such a program can be successful if applied to "part time instructors" or to hospital residents "taking a basic science year." It needs devotion to the full time job of entering academic medicine. As a professor of anatomy once said to me, "It takes at least five years to develop an anatomist. After that the job is fun for him and he is ready to be of great service to his department."

These words are not to be construed as arising from local situations at either the University of Wisconsin or the present department. At both institutions the Heads and Major Professors are in accordance with the philosophy of this article.

With such a program, the anatomical field and medical science, in general, can go much farther in attracting capable young physicians to academic medicine. The result will be progress in medical education and research in general.

Planning an Instructional Program for a Medical School*

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Medical College of Virginia
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Planning an instructional program for any school or college must be preceded by a clear definition and statement of purpose. One cannot plan with any degree of precision until one knows for what purpose one is planning. Furthermore, planning will be of little practical use unless plans are put into operation, in part at least. The natural sequence in carrying plans into realities is an evaluation of whether or not the plans accomplished the purposes which motivated the plans in the first place. It would seem, then, that a sequential series of logical activities will be (1) defining purposes; (2) making plans to accomplish these purposes as expeditiously, efficiently, and surely as possible; (3) putting the plans into operation on an initial experimental basis; (4) evaluating the degree of wisdom and correlation between the purposes and the plans as worked out in actual situations.

All of this appears so simple and clear that we wonder why there is any need of consideration further with regard to the preparation of students in medical schools. One rather inclusive reason why there is still much indecision in medical education is the matter of our rapidly and greatly changing world—conditions of life and living which make old plans and procedures obsolete in this day and age. Keeping up with the times presents a very difficult problem—many difficult problems. All educational institutions are in a state of ferment as they face the problems precipitated by our changing world. Medical schools are not the least active ones. What to do, and how to do it are questions pressing for intelligent answers.

Why is education, itself, so confused, disjointed, disintegrated? We have formed the habit of blaming someone else for all this confusion and disintegration. We, ourselves, are to blame, I firmly believe. Research, which has made possible so wonderful a world, has contributed to the confusion by discoveries which bring to our attention very important facts and principles not before known. We seize upon them and, eventually, have new courses in our schools and colleges. These necessary additions create an overloaded curriculum—actually, in many cases, a warring series of courses, competing for attention and favor. We do not seem to realize that these new discoveries often render old practices obsolete and behind the times. They really change the older established points of view and imply new integrations which are not carried out when they should be. The new should be fused with the old, to make a considerably different mixture or product. Fusion is carried on too slowly, but it is in process, we cannot doubt. The courses in biochemistry and biophysics are examples of such fusion. A short time ago, I made a study to see whether or not integra-

*Read at the Fifty-ninth Annual Meeting of the Association of American Medical Colleges, held at White Sulphur Springs, W. Va., November 8-10, 1948.

tions of course materials and purposes were taking place, and found some seventy-six such courses listed in a sample of college catalogues examined. The titles of these courses may be found in a published article, "Synthetic Courses in Our Schools and Colleges."¹ "The Nature of the World and Man," University of Chicago, and "Society and the Individual" are illustrations of some of these courses. We have had a course in our school of nursing for over a year now—entitled "Man and His Sociological and Psychological Environment" and have evidence to substantiate the conclusion that it is not only feasible and possible, but productive.

During the last four years, the Bureau of Educational Research at the Medical College of Virginia has been attempting to establish a foundation upon which may be built a reasonable plan of activities which may eventually lead to a better program of medical education. In doing this, solicitation of help from other medical schools has been in process. Deans of medical schools and their colleagues have been asked to help out in the thinking needed to progress wisely. The cooperation shown is hereby gratefully acknowledged. At times it has been difficult to impose upon these persons in order to borrow of their already busy lives, time to concern themselves with the activities of the Bureau. The suggestions made have been helpful and, constructive.

The attempt was made to build upon statements made by writers dating back to about 1926. A tabulation of suggestions, gleaned from nearly 200 published articles during a twenty-year period, most of them in the *JOURNAL*, disclosed some uniformity of thinking in regard to improving medical school instruction. The following statements sum up the suggestions standing out in this study: "I. Concern for, and study of, the curriculum, in order to remedy its deficiencies and improve it as a whole; II. Unification of all parts of the premedical and medical curriculum into a unified whole to accomplish the major aim and contributing objectives, laid down as guide posts; III. Adequate but not too specialized considerations of the parts of the curriculum which make up the whole; IV. Attention to the student as a responsible self-learner with the instructor as a guide and director of learning so that the abilities of the student will be developed to the optimum to make him a successful medical practitioner and person; V. Consideration of the patient as a total personality in a general and particularized environment—physical, biological, social, and psychological—to the end that the student doctor may get a complete insight into all factors of health and disease; VI. Aspects of the qualifications of instructors, and the methods and procedures used in their functions of instruction."

This investigation was followed by an attempt to establish more clearly-thought-through purposes, aims, objectives for medical education, which, in an introductory questionnaire, was indicated as a most important need by those responding. While there was not unanimous agreement by all respondents, there was a commanding majority opinion in favor of the following:

I. Center study and investigation around understanding living man—physio-

1. "Synthetic Courses in Our Schools and Colleges." *School Review*, September, 1945, pp. 409-412.

logical, sociological—in his dynamic and changing environment, with emphasis upon the effects of all factors on the health and well-being of the individual.

II. Adopt, as a long-view objective, the promotion of activities designed to bring about the best possible conditions for the continuous maintenance of health for all people.

III. Adopt, as a contributing objective, the collection and dissemination of health knowledge and information through educational institutions—church, press, radio, theater, public and private discussion groups—with the purpose of promoting individual understanding of, and attention to, personal and public health, and prevention of illness and disability.

IV. Adopt, as a contributing objective, the best and most efficient means of treating and caring for the physically and mentally sick, injured, or handicapped.

The implications of these aims or purposes are tremendous in their ultimate effects upon community health and well being. They distinctly emphasize some of the points of view brought out so clearly in *Widening Horizons in Medical Education*,² recently published, particularly that "medicine is a natural and social science."

However, purposes and objectives are not worth much if nothing is done to realize them in everyday life. The next step in the series of investigations centered around the curriculum areas which must be recognized and cared for in order to accomplish the objectives set forth. It is to be emphasized that, in order to efficiently function, the planning should not be restricted to traditional, conventionally-classified fields of endeavor common in many of our schools and colleges, but should envisage new integrations feasible and possible. It is becoming more and more evident that present classifications of courses of study are suffering, in wide outlook, because boundaries between present courses are so insurmountable. While we talk about integration, we handle only conventional and traditional packages, afraid to break them up and integrate them for more efficient use. The mystery is how we can expect them to function in life when we continue to treat them as separate entities.

The areas, as they emerged from the study, are as follows:

Area I. The study of physical man as he progresses from conception, to birth, to childhood, to adolescence, to adulthood, to senescence, to death—involving both distinctly physical and mental aspects. Spiritual was included, by implication, in these categories.

Area II. The special study of the relations of man to his environment—physical, biological, social, and psychological—involving the effects of the environment upon the individual, and the effects of the individual upon the environment. The term environment should encompass concepts now being classified under the term culture—an emerging term often grouped with factors which condition what a man is—heredity, environment, culture. Huntington,

2. A Report of the Joint Committees of the Association of American Medical Colleges and the American Association of Medical Social Workers, *Widening Horizons in Medical Education*. New York: The Commonwealth Fund, 1948.

in his *Mainsprings of Civilization*,³ has brought out this significance of culture rather clearly.

Area III. Concentrated studies of the many deviations from normal well-being and health, involving causes, prevention, treatment and care.

Area IV. Duties and functions of the doctor of medicine in the social pattern—historical perspective, present status, personal problems, personality characteristics, future possibilities.

Area V. General skills and techniques as contrasted with information, knowledge, and appreciation.

Area VI. The varieties and functions of specialization in the fields of personal and public health.

Area VII. Induction into experiences for applications of principles to concrete practical situations—practice work of various kinds as contrasted with what we understand by theory in the phrase, *theory* and *practice*.

The most difficult task comes in attempting to build a curriculum which will incorporate these areas in the most meaningful and efficient manner—breaking away from some of our present course nomenclature. Involved is organization of instruction. Shall schedules be arranged on a broad basis of semesters and semester-hours of credit, with broad course categories and a relatively small number of integrated courses and instructors particularly prepared in teaching; or split up into detailed sub-areas arranged on a clock-hour basis, with a large number of courses of varying lengths, with many instructors—specialists in relatively narrow fields without preparation in the elements of teaching? There is now developing a new science of the psychology of learning and teaching, which, although it is about 200 years behind the so-called natural sciences in development, is beginning to make clear to us that we have much yet to learn about the learning process itself, that planning in this area yields dividends which well repay the investments made. How people learn, and what they learn, together with the functions of the instructor in the learning process—all are becoming more clear in the educational process. We have coined a phrase which seems to help elucidate a much-discussed controversy, viz.: "We learn to do by purposing, planning, doing, and evaluating." It seems to pack considerable common sense, to us anyway. The question in medical education with reference to teaching and learning becomes "How much should instructors know and appreciate about the learning process itself?"

The studies previously mentioned were followed by one which, through cooperative opinion, attempted to outline a four-year medical curriculum derived from the areas listed. Integration was a major consideration in its construction. It includes but eight comprehensive courses to avoid the confusion incident to a large number of more detailed courses, so common in present medical schools. These eight courses naturally contrast significantly with one actual curriculum listing 55 courses ranging in length from 4 hours to 320 hours. There is no implication that only eight instructors carry the whole load, but

3. Ellsworth Huntington. *Mainsprings of Civilization*. New York: John Wiley and Sons, 1945.

with co-ordinators for each course in the eight, the number of instructors could be made less, and integration would be more sure to result. The student-faculty ratio is now very low, therefore expensive. It could easily be increased somewhat advantageously for all. The following is the suggested possible curriculum.

SUGGESTED POSSIBLE CURRICULUM WITH COURSE TITLES

First Year

1. Normal Man and His Environment
 - a. Physical
 - b. Biological
 - c. Social
 - d. Psychological

Illustrated
by cases
2. The Normal Life Cycle
 - a. Anatomical
 - b. Physiological
 - c. Psychological
 - d. Sociological

Living case
studies

Second Year

3. Pathological Conditions in Man—Physical, Mental
 - a. Causes
 - b. Prevention

Case studies in hospital or home
4. Pathological Conditions. Methods of Prevention and Cure
 - a. Drugs and their uses
 - b. Therapies of physical medicine

Third Year

5. Methods of Prevention and Cure, Continued
 - c. Diet therapy
 - d. Psychology and psychiatry
 - e. Surgical therapies

Case
Work
6. Community and Public Health
 - a. Present organization
 - b. Problems and solutions

Case
Work

Fourth Year

7. The Physician in the Social Order
 - a. Health education
 - b. Ethical standards
 - c. Historical background

Case
Work
 8. Medical specializations and research
 9. Supervised practice in varied fields.
- Case Work

The word integration has been ringing in our ears for a long time now. We have been crying for integration of persons, of organization, of school curriculums, of school courses, of school instruction. To integrate means to bring together to form a whole. Today, there is great lack of desirable integration. People's personalities are too much split up. With over half our hospital beds

filled with mental cases, disintegration of personality is quite evident as a factor needing more attention. Psychophysical medicine has been increasingly a field of discussion and controversy. Mental and physical are indivisible in everyday life activity. Intelligent diagnoses and therapies must give due attention to the psychological as well as the physical factors.

Psychosocial medicine has also gained an entry into recognized divisions of the interests of medical men. The science of semantics is bringing to the fore the necessity for more study and investigation of social intercommunication—the language bridges which tie up men with men. The bridges are showing signs of disintegration also. Understanding between men is sadly in need of remediation and therapy. A book by one of your own profession—*Psychosocial Medicine, a Study of the Sick Society*,⁴ also illustrates this social element.

The suggested courses in the proposed curriculum are planned to carry out this concept of synthesis and integration. The plan is to bring the integrations up to date, particularly in orientation and insight, for the needed revision of broad points of view, and to retain all valid and pertinent content still essential, within the reconstructed general framework. Nothing useful is discarded but a re-orientation of a functional nature is to be accomplished, in keeping with the adopted purposes, aims, and objectives.

The philosophy behind the whole project is that, if we are to get integration, we must plan all parts of the total curriculum to bring about the integration. Merely trying to integrate existing courses without the new and necessary revised point of view in the large, is not likely to be successful. Planning for the whole, with later possible needed division, is more likely to succeed than taking present divisions and attempting to fit them together. The old divisions simply will not fit well together because of the new viewpoints brought out by research. We discard obsolete points of view too reluctantly.

It is evident that planning an instructional program must be followed by experimentation if we are to collect evidence on whether or not the plans are reasonable, logical, and worthwhile. Without such experimentation, we are not far from where we started. Experimentation is of value only when valid and reliable evaluation and appraisal verify the wisdom of the changes made. And evaluation in the realm of learning and teaching is only in its primary stages. There has been much study and investigation in preparing and using tests and examinations. The effort to develop objective measures to eliminate sole dependence upon individual personal judgment, which has some disadvantages of unreliability, is an outstanding development. Measured reliability of many of the new types of test is very high. The characteristic about which we are in considerable doubt is validity, itself. What do these tests really measure? Do they measure that which they purport to measure? At a conference of testing experts which I recently attended, validity was the great concern. The nearer tests get to the testing of performance, the higher the validity. We have thousands of tests now on the market, each highly recommended by its enthusiastic

4. James L. Halliday, M.D., D.P.H., *Psychosocial Medicine, A Study of the Sick Society*. W. W. Norton Company, 1948.

builder. But thoughtful test critics question the validity of many of them. We need more valid performance tests which may be used to test validities of those not on the desired performance level.

At the Medical College we have been working enthusiastically on a group of tests to measure meaningful insight into principles, and theories, and other reputable generalizations. These tests do not emphasize mere memory of names, dates, things, or words, but stress understanding of principles. Facts, names, words, or things mean little to practical workers until they are parts of principles or generalizations. The important factor in practice is the correct application of a principle. We recommend, therefore, a collection of principles and generalizations in the course areas given above as a fruitful source of course content and preparation of course tests and examinations. With better evaluation, we may better judge the desirability of what we try to teach and how we teach it. The search for principles and generalizations is, itself, a means of clarifying the aims and objectives of the courses we offer. Certainly, understanding of principles and generalizations is a paramount aim in any and every course. The slogan is "more emphasis upon principle, less on mere detail." Surely, in surgery especially, detail is exceedingly important, but it may be overstressed in certain other fields. Specialization must concern itself with a study of fine detail, but overview and insight may be blinded by too much preoccupation with detail. This is the implication of the statement that "he couldn't see the forest for the trees."

We wish to thank those who have sent us materials from their own studies—*The Mission of a Medical School*, prepared by the faculty of New York University College of Medicine; *Final Report of the University of Colorado School of Medicine Curriculum Committee*; and other more limited papers and discussions. The files of the JOURNAL of this association have proved invaluable. The Curriculum Committee of the Medical College of Virginia is now engaged in an intensive curriculum study. Only through careful planning and controlled experimentation, employing valid and reliable evaluation devices, may we hope to make real progress in providing a better health program for our communities and nation.

DISCUSSION

DR. WARD DARLEY (University of Colorado): We have been waiting with considerable interest for an analysis of the material Dr. Hurd has just presented. It seems to me that as we give consideration to curricular revision, our thinking should be aimed at the practical results we hope to achieve. I would like to submit that a reorganization of the medical school curriculum which is in line with Dr. Hurd's material will revitalize the faculty and the student body. We all recognize that our primary aim is to train individuals who are physicians at heart, and, if we can really accomplish this, I believe that the attitude on the part of our new graduates will be such that we need not worry too much about the question of the distribution of physicians and about the balance between general physicians and specialists.

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Evaluation of Foreign Medical Credentials

The problems of evaluating the credentials of graduates of foreign medical schools has always been a disturbing one. The lack of accurate information regarding the operation of foreign medical schools has made it difficult, in fact, almost impossible, to make a correct and worth while evaluation of their credits. General information — perhaps, rather a sort of tacit understanding, has been responsible for placing a few foreign medical schools in an acceptable category. But, even in such instances, accuracy was not available. Individuals who visited foreign medical schools casually on a jaunting trip or who may have spent a month or two in the pursuit of certain information pertaining to a specialty practiced by them, expressed opinions as to what they thought about a certain medical school. But, on the whole, the available information was far from being reliable. In 1932, the Association of American Medical Colleges, the National Board of Medical Examiners, the Council on Medical Education and Hospitals of the American Medical Association, and the Federation of State Licensing Boards discussed this problem and arrived at a somewhat satisfactory solution. It was decided that graduates of foreign medical schools must either spend one year in one of our own medical schools, or serve an internship in an approved hospital, before they could be eligible for licensure. Some state boards added the requirement of citizenship.

Not until the political upheaval in Germany did the question again become acute by reason of the fact that so many German practitioners were seeking refuge in the United States. However,

practically nothing was done to meet the problem until about two years ago when the Council on Medical Education and Hospitals of the American Medical Association and the Association of American Medical Colleges joined in setting up a Committee on the Evaluation of Foreign Credentials. The Committee had several meetings, but nothing of any importance resulted from these meetings. A third meeting of this committee, considerably enlarged in membership, was held in Chicago on March 25, 1949, under the sponsorship of the Council on Medical Education and Hospitals of the American Medical Association. Representation from many interested organizations was requested and the attendance was a most satisfactory one. The main object of the meeting was to prepare a statement that could be used by the various licensing boards in explaining to the public the fundamental problems involved in licensing foreign medical graduates. This statement was also to be used in advising applicants for admission to medical school who were unable to secure admission to one of our own schools and who, therefore, were planning to go abroad for their medical training.

It was agreed, finally, that state licensing boards be urged to take an enlightened view toward the foreign trained physician and that a mechanism be developed by which the Council on Medical Education and Hospitals of the American Medical Association and the Association of American Medical Colleges might create a list of approved foreign medical schools. It was agreed that dependable information could not be obtained solely on the basis of a questionnaire study and data gathered

by American physicians visiting abroad. Various methods for obtaining the desired and needed information about foreign medical schools were suggested, one of which was to compile existing information which would serve as a basis for the preparation of a list of approved foreign medical schools. The main objective is to set up a standard which must be met by the foreign graduate in order to satisfy a licensing body, representing the public, as to his competency, before he is permitted to practice. This principle is essential for the protection of the public. It is essential that the best assurance of the quality of training that a physician has received is an intimate knowledge of the faculty, facilities, curriculum and standards of the medical school from which he was graduated. While a policy of complete exclusion cannot be defended, it is clear that until more information can be obtained about the present quality of medical schools abroad, the licensing boards would fail in their responsibility to the public if they did not use the greatest care and discretion in admitting foreign trained physicians to their examinations.

The Committee on Foreign Medical Credentials finds itself charged, therefore, with securing the information about the quality of foreign medical schools—a task, the enormity of which cannot be underestimated but which must be met in the interests of all concerned. Reports on the continued activities of this committee will be published as soon as they are available.

* *

Appointment of Interns

At the White Sulphur Springs meeting, the Association, in Executive Session, modified the Uniform Intern Placement Plan recommended by the Committee on Internships and Residencies. The modification consisted in changing the original statement, "Acceptance of appointments should be made promptly; applicants should be allowed a reasonable period of time to consider appointment offers but no specified waiting period after 12:01 A. M. (on the third

Tuesday of November) is obligatory," to read as follows: "Acceptance of appointments should be made promptly. However, no hospital should require that an applicant file his acceptance before 12:00 noon on November 15, 1949."

At the time the modification was voted, doubt was expressed that the American Hospital Association would accept the change and such has proven to be the case. The American Hospital Association since then submitted a plan acceptable to that group.

In order to get the reaction of the member colleges to this plan, a questionnaire was sent to the deans requesting their vote. The majority of the deans voting favored the adoption of the Co-operative Plan for the Appointment of Interns proposed by the American Hospital Association. This plan for 1949, which will apply only to undergraduate students in the fourth year of their medical school course is as follows: Application for Internships.

1. Applications are to be filed with the hospitals beginning on the third Tuesday in October (October 18, 1949).

2. Application should be made in duplicate; the original to be forwarded to the dean of the applicant's medical school for transmission together with credentials to the hospital or hospitals of the applicant's choice; the second copy to be mailed directly to the hospital or hospitals by the applicant.

3. The application may be accompanied by letters of recommendation from faculty members. Such letters of recommendation shall not be routinely requested by hospitals.

4. The number of applications filed shall not be limited in number.

Tendering of Internship Appointments.

1. The tendering of internship appointments by hospitals shall be made by telegram. No telegram shall be sent which will arrive prior to 12:01 A. M. of the third Tuesday in November (November 15, 1949). Telegrams may be

filed in advance for delivery at 12:01 A. M.

Applicants may visit hospitals and be interviewed by the Intern Committee but the hospital or its representative shall not commit the hospital or the applicant before November 15, 1949.

2. Hospitals may notify alternates of their status at the same time and in the same manner as their first choice candidates.

Acceptance of Appointments.

1. Acceptance of appointments should be made promptly. Applicants should be allowed a reasonable period of time to consider appointment offers, but no specified waiting period after 12:01 A. M. is obligatory.

2. Upon acceptance of an appointment, prompt notification of withdrawal of applications to other hospitals which have offered appointments should be made.

♦ ♦

Study of Public Health Service Grants and Fellowship Programs

On the recommendation of the National Advisory Health Council, a Special Committee has been appointed by the Surgeon General of the Public Health Service to study the Public Health Service research and educational grants and fellowships, the cost of medical education and the effect of these grants on medical school finances and on medical education. The purpose of this study is to evaluate existing grant and fellowship programs and policies and to provide a basis for advice on the financial needs of medical education. The members of this Committee are: Dr. Lowell J. Reed, Dr. George Baehr, Dr. Robin C. Buerki, Dr. Edward A. Doisy, Dr. E. G. Gustavson, Dr. Algo Henderson, Dr. E. E. Irons, Dr. Carley Jacobsen, Dr. Hugh Morgan, Dr. B. O. Raulston, Dr. James S. Simmons and Dr. Herman B. Wells.

The Special Committee has consulted with the Committee on the Survey of Medical Education, sponsored by the Council on Medical Education and Hos-

pitals of the American Medical Association and the Association of American Medical Colleges. While the two committees will carry out their studies independently, every effort is being made to coordinate their activities with the view of avoiding unnecessary duplication of work and reducing the demands on the officers and faculties of the medical schools.

The study by the Surgeon General's Committee will be conducted through a series of regional meetings of the deans and finance officers of the medical schools and through subsequent interviews by a representative of the Committee. The first regional meeting will be held in Atlanta on March 21. Meetings in other regions are being scheduled for April.

♦ ♦

Shortage in Manpower Facing Medical Departments of Armed Forces

Attention is called to the statement made by Brigadier General George Armstrong, Deputy Surgeon General of the U. S. Army, which was published in the January, 1949, issue of the Journal. It is a plea for physicians to enter service to help overcome a serious situation with which the Army is faced. Now, the Secretary of Defense calls attention to the fact that by July of this year will have lost almost one-third of their present staff of physicians because the tours of duty of these men will expire and normal replacement measures cannot fill the vast number of vacancies which will arise. There will be a shortage of about 1,600 physicians. By next December, this shortage will grow to 2,200 physicians. By then, the Armed Forces will not have enough professional men to give minimum medical service to the Armed Forces.

Medical men are requested to give serious consideration to this highly important matter and give such help as they can, either by allying themselves with a government service or get some competent physician to offer his help. There are many physicians who received the financial benefits of the

ASTP and the V-12 programs but who did not give service to the government in return for this help. These men should be willing to help when help is needed so badly.

* *

Rejection of Application

Notifying an applicant for admission to a medical school of his rejection has always been a somewhat embarrassing problem for the admitting officer. Manifestly, it is impossible to accept every applicant, in the main, because his credentials are not satisfactory—they do not meet the standards for admission set up by the school, either because they do not cover subject requirements or because scholarship is not acceptable. Then, too, of great importance is the fact that medical schools cannot accept more applicants than their facilities will permit. These facilities include physical setup, number of teaching personnel and clinical facilities. It has long been established that schools which limit their student body to a rather small number are able to give the best instruction. It becomes more personal than is possible with a large student body—unless existing facilities permit of teaching in sections—which demands a large teaching force. The usually large number of applicants in recent years has made the problem of giving notice of rejection more acute. How should it be done? How can it be done without creating too much of a mental upset of the applicant?

Some schools have used rejection slips. Others have merely informed the applicant that he has not been accepted, no reason being given. The reason given often is "class full." While this is really a very good reason, yet many applicants regard it as more or less of a dodge, one which cloaks the real reason. Of course, that is not true. The school sets up a certain quota and when that quota is reached it cannot make any more acceptances. It may place some applicants on an alternate list from which a choice is made if an accepted applicant fails to appear.

What sort of a rejection notice will best meet the problem by way of a satisfactory solution? Should the school make a complete statement of facts, such as how many applications were received? What is the quota of the school? What was the civil status of the applicants? Whence did they come? State institutions are usually limited as to how many out of state applicants can be accepted. That fact can be communicated to the applicant if he is in that category. There are so many confusing and erroneous thoughts in the minds of the public about the acceptance of applicants that it seems imperative at this time, more than ever before, to clarify the situation by making statements which are authoritative. In one case, a school gave the rejected applicant a very "softening" letter which, it was learned later, was used as a recommendation when the recipient sought admission to another medical school. Doubtless, the rejected applicant is entitled to know exactly why his application was not accepted. Such a statement would, no doubt, be helpful in attempting to secure admission to another medical school.

Why not consider this problem as a major one and make every effort to arrive at a satisfactory solution?

* *

The Medical Film Institute of the Association of American Medical Colleges

The first months of operation of the Medical Film Institute have been active and functional. The initial work load appears to confirm the basic need for the Institute. In addition to the establishment of the physical plant, the Institute has begun activity in its planned pattern. The Advisory Committee met April 28th at the New York Academy of Medicine Building, 2 West 103rd Street, for its first business session. Details of this meeting will be published in the July issue of *The Journal*. The Advisory Committee consists of the following: Joseph S. Barr, Wm. L. Benedict, Walter A. Bloedorn, Thos. D.

Dublin, Orville Goldner, Jacques P. Gray, Francis Keppel, Tom Jones, Joe E. Markee, Robt. V. Schultz, Warren Sturgis, Robt. P. Walton and Dean F. Smiley (ex officio).

Work contracts and grants are as follows:

1.—A grant has been made by the National Cancer Institute for the production of a film on the progress of cancer research; the Department of Health and Welfare has made a grant of equal amount to the National Film Board of Canada; the Film Board will do the actual production, but in collaboration with the Medical Film Institute as American co-producer.

2.—A contract has been made with the U. S. Department of State to do a limited film appraisal project, films to be used abroad on recommendation of the Institute.

3.—A contract has been made with the U. S. Public Health Service to conduct a survey of the Service programs and to recommend specific audiovisual activities, policies and practices.

4.—A grant from the Office of Naval Research has been requested for two experimental films on human development, to be produced in collaboration with Dr. Arnold Gesell.

5.—Steps have been taken to establish a production information service in collaboration with the medical film production units; this service will not only prevent unnecessary duplication, but will make possible the direction of production toward those curriculum segments as yet largely unaccounted for.

6.—Further steps have been taken to forward the pilot program of curriculum integrated films in preventive medicine.

The Institute has not as yet established its film information service to medical school faculties. This service rests on the systematic film appraisal program, which itself cannot be initiated until support has been secured. No plan for film distribution to the medical schools can be made functional in the near future. Direct free consultation services to medical schools at large

will be available only in the future. Consultant services may be contracted for on an individual problem basis.

* *

Foreign Medical Schools

At a meeting of the Federation of State Medical Boards held in Chicago, February 8, 1949, the following resolutions were passed:

WHEREAS, from information from all available sources, medical education is in a deplorable state in the vast majority of foreign countries, and

WHEREAS, there has been no survey made of foreign schools since prior to World War I, and

WHEREAS, it is generally known that there has been a marked deterioration in medical teaching and equipment since 1935, therefore be it

RESOLVED, That no candidate be admitted for examination who graduated subsequent to 1935, and all physicians graduating prior to 1935 will be required to meet the requirements of the State Board of Medical Examiners in the state where they are seeking a license.

Veterans Administration

WHEREAS, the Veterans Administration of the Federal Government has seen fit to defray the expenses of veterans attending foreign medical schools, and

WHEREAS, the foreign schools are far below American medical colleges, and

WHEREAS, few states will recognize these schools due to the fact that there is no agency to evaluate these medical schools, therefore be it

RESOLVED, That the Federation deplores such action and respectfully suggests that no more veteran candidates be allowed to register in these schools and that those already in registration be sent an official notification by the Administration that there are few, if any, states that allow these individuals the privilege of practicing medicine and surgery in these states.

Fulbright Act: Research and Teaching Abroad

The Fulbright Act authorized the Secretary of State to set aside a portion of the foreign currencies resulting from the sale of surplus government property abroad for educational exchange programs with certain foreign countries in all fields of teaching and advanced research in institutions of higher learning abroad. Agreements providing for educational exchanges have been signed with ten countries: Belgium and Luxembourg, Burma, China, France, Greece, Italy, New Zealand, the Philippines, and the United Kingdom. It is expected that agreements may be signed at a future date with the following countries: Australia, Austria, Egypt, India, Iran, The Netherlands, The Netherlands East Indies, Norway, Pakistan, Siam and Turkey. The only funds made available by the Act are in foreign currencies. Consequently, each American participating in the program must make his own individual arrangements for such dollar balances as he will require to meet family needs and other obligations in the United States during his absence abroad.

The Fulbright Program is still in its initial stages and policy decisions are in the process of formulation. However, stipends may be expected to bear a reasonable relation to the grantee's salary and in addition an allowance may be provided for housing and cost of living as well as a small allowance for books and equipment, local travel, etc. Transportation for grantees from and to the United States may be provided, in addition to the total award, when the foreign currency is acceptable to carriers. Transportation inside the United States will not be provided.

While the term educational activities may be interpreted very broadly, the following amplification will serve as an indication of those envisaged: (1) Assistance to Americans to study, teach and conduct research abroad in connection with institutions of higher learning, and to add to the store of knowledge of foreign areas, peoples and cul-

ture. (2) Assistance to a limited number of foreign students to study in American institutions in their respective countries and to assist foreign students and teachers to engage in educational activities in the United States by paying for their transportation wherever foreign currencies can be used for this purpose. The Fulbright Act authorized the creation of a Board of Foreign Scholarships charged with the responsibility of supervising the exchange program including the selection of the participating individuals and institutions. The members of the Board represent a wide range of educational and cultural interests as well as certain government agencies. The Board and the Department of State have delegated responsibility for preliminary screening of applicants for grants to three agencies: The Conference Board of Associated Research Councils, the U. S. Office of Education and the Institute of International Education. For discharging its part of the responsibility, the Conference Board has established a Committee on International Exchange of Persons with offices at the National Academy of Sciences, Washington, D. C.

All inquiries concerning the exchange of professors, lecturers, specialists, and research scholars at the postdoctoral level should be addressed to: The Executive Secretary, Committee on International Exchange of Persons, Conference Board of Associated Research Councils, 2101 Constitution Avenue, Washington 25, D. C.

Inquiries relating to the exchange of students at the predoctoral level should be addressed to: Director of the Fulbright Division, The Institute of International Education, 2 West 45th Street, New York 19, New York.

Inquiries relating to teaching in non-American primary and secondary schools in foreign countries should be addressed to: Division of International Educational Relations, The United States Office of Education, Federal Security Agency, 4th and Independence Avenue, S. W., Washington 25, D. C.

In addition to the responsibilities out-

lined above, the Conference Board, through the American Council on Education, is also responsible for preliminary screening of applicants for teaching positions in American elementary and secondary schools and, therefore, inquiries relating to such teaching positions should be addressed to: American Schools Service, American Council on Education, 744 Jackson Place, N. W., Washington 6, D. C.

Inquiries relating to exchanges other than those authorized by the Fulbright Act should be addressed to: The Division of Exchange of Persons, Department of State, Washington 25, D. C.

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State Rural Health Committee in Action

Two years ago the idea of expanding the rural health program of the Michigan State Medical Society was born. The sponsors included farm organizations, medical societies, universities, educational associations, health departments, pharmaceutical and nursing groups, crippled children and cancer societies, parents and teachers and others. One part of the program considered the problem of attracting physicians to rural areas. It was decided to set up a scholarship fund for medical students who would agree to practice in rural areas and to secure increased appropriations for medical schools. Other health problems were also given support. Problems involving health and the dissemination of information on health and progress in medical science, nurses and other ancillary topics were also discussed and received the unanimous support of all organizations represented at these meetings. Michigan can be proud of this

achievement which involves cooperation of not only the medical and nursing professions, but also of the people of the State. Naturally, adequate financial support is also vital to the success of such an extensive program.

Scholarships for medical students.—A special fund was set up in a separate corporation called "The Michigan Foundation for Medical and Health Education." This Foundation receives donations from all possible sources for educational purposes. To date, over \$100,000 has been contributed to the Foundation. Scholarships have been announced with provisions requiring practice in rural areas, similar to those in many other states. A program for presenting the opportunities and advantages of rural practice by outstanding family physicians from small communities to medical students was inaugurated and has been well received. Even freshmen students show great interest. A placement service for rural physicians was established by the State Society. All doctors who asked for information about rural areas were given a complete list of all towns requesting physicians. Also, all towns were informed of available doctors and their qualifications. To date, many additional physicians have settled in the rural areas of Michigan thanks to this service.

Increased appropriations to medical schools.—This involved action by the legislature. The legislature was persuaded to appropriate well over a million dollars for a new maternity hospital in connection with the University of Michigan. In addition, a committee was appointed by the State Medical Society to cooperate with the deans of the medical schools toward the end of providing additional facilities and instruction.

College News

University of Colorado School of Medicine

Plans for expansion at the University of Colorado Medical Center in Denver are aimed at "paving the way for concentrating all university activities having to do with health science services at the Medical Center." Dr. Darley, formerly dean of the medical school, was named executive dean in charge of health sciences and services. Dr. Robert C. Lewis, professor of biochemistry, was appointed acting dean of the medical school, and Dr. George W. Currie was named administrator of Colorado General and Colorado Psychopathic hospitals. Dr. Robert C. Liggett continues as assistant dean of the medical school.

Expansion in the building program at the center includes plans for construction of a \$588,000 cancer research building and the addition of a fourth floor to the east wing of the center to accommodate expansion of the maternity ward and nurseries.

The medical center is one of six key centers in the nation selected by the National Cancer Institute of the United States Public Health Service for establishment of one of the most modern and up-to-date cancer research facilities in the country. The government has approved a \$400,000 federal aid grant, which will be supplemented by \$188,000 instate funds, for construction of the building.

A sanitarian training center, the only one of its kind in the Rocky Mountain region, was recently established. The program provides for a three month course of intensive study in sanitation for qualified young men and women to aid in overcoming a great shortage of trained sanitation personnel. The center is administered cooperatively by the U. S. Public Health Service local district, the Colorado state health department, the city of Denver, and the university's medical school.

The Medical Center is offering a three year fellowship in industrial medicine. The course will give advanced training in industrial medicine leading to the degree Doctor of Industrial Medicine. The stipends will be \$1,800 and \$2,400 for the first and second years respectively. Appointments are made January 1 and July 1. This course is approved by the Veterans Administration for candidates who are eligible under the G. I. Bill of Rights. The first two years will consist of didactic work. Time and facilities for research will be provided, and a thesis will be required. The third year will be spent in training in industry under supervision. The stipend for this year will be announced later. Requirements include graduation from an approved medical school, at least one year of internship training, and preferably at least one year of residency training in one of the specialties or one or more years of practice of medicine. For further information write Frank Princi, M.D., Director, Division of Industrial Medicine, University of Colorado Medical Center, Denver.

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University of Illinois College of Medicine

Six grants in the total amount of \$22,825 have been awarded for research studies.

The Pope Foundation, Inc., Chicago, has made a \$10,000 grant for the support of a research program destined to establish dynamic techniques for the analysis of neuromuscular skeletal pathology.

Bristol Laboratories, Inc., Syracuse, N. Y., has renewed a \$7,000 grant for research on the pharmacology of synthetic penicillin derivatives and analgesic drugs.

A study of the role of amino acid metabolism in leukemia will be supported by a grant of \$4,200 made by the National Institute of Health.

Other grants have been received from the American Medical Association, \$625, for the study of the effect of beta radiation from Radium D on the eye; the G. D. Searle Company, \$600, for a preliminary study of the antacid compounds; and Abbott Laboratories, \$400, for the study of the effect of penicillin and streptomycin in peritonitis as produced experimentally.

Dr. Joan Fleming has been appointed an assistant professor of psychiatry.

Dr. Milan V. Novak has been appointed assistant dean of the Graduate College for the University of Illinois Chicago Professional Colleges.

Dr. Louis N. Ridenour of Urbana is the dean of the Graduate College. Dr. Novak will be in charge of administrative duties for the Graduate College on the campus of the Chicago Professional Colleges.

Dr. Max S. Sadove has been appointed acting head of the Division of Anesthesiology.

The U. S. Public Health Service has awarded a grant in the amount of \$5,500 to the University of Illinois College of Medicine for the continuation of a research project. The grant will support a second year of study on the physiological effects of the influenza virus on the host. The project is under the supervision of Dr. J. E. Kempf in the department of bacteriology.

Seven anonymous donors recently contributed \$1,850 to the college for the establishment of a trust fund to assist investigation in renal research by the departments of pharmacology and medicine.

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Medical College of Virginia

Seven members of the adjunct faculty have been promoted to the major faculty, effective July 1: Dr. Thomas W. Murrell, Jr., from associate to assistant professor in dermatology and syphilology; Dr. James O. Burke, from associate in medicine to assistant professor of medicine; Dr. G. Watson James, III, from research fellow in medicine to as-

stant professor of medicine; Dr. H. St. George Tucker, Jr., from associate in medicine to assistant professor of medicine; Dr. Leslie Edwards from associate in physiology to assistant professor of physiology; Dr. Benedict Eagler from associate to assistant professor of psychiatry and neurology, and Dr. William L. Weaver from associate to assistant professor of public health.

Thirty-eight new members have been appointed to the adjunct faculty. Twenty-seven promotions have been approved within the adjunct faculty. The adjunct faculty is composed of those below professorial rank.

The hospital division of the college will shortly start manufacturing its own oxygen. It is in the process of installing a generator capable of producing 500,000 cubic feet of oxygen per month. This will be the largest unit installed at a hospital in the world and the second unit to be installed in a hospital. Oxygen obtained by the simple expedient of turning on a faucet will be piped at first to all operating rooms, emergency rooms, and nurseries in the hospitals of the division as well as to two private rooms on each floor. The system is scheduled for full operation by July 1. The institution is renting the equipment from Air Products Corporation and will pay for it on a sliding scale based on the amount of oxygen consumed. Based on the current rate of consumption of from 150,000 to 200,000 cubic feet per month, the hospital will pay to generate its own oxygen an estimated \$12,000, whereas at the present time it is paying about \$21,000 per year.

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University of Texas Medical Branch

Dr. Necmettin Folvin, professor of neurology at the University of Istanbul, is spending several months in the Tissue Culture Laboratory, in association with Dr. C. M. Pomerat, director. With Dr. Pomerat he is developing new methods for the growth of brain tissue in artificial media.

The Sealy and Smith Foundation of Galveston has made a gift of \$22,000 to the John Sealy Hospital for the installation of special X-ray equipment in the Special Surgical Unit under the direction of Dr. Truman G. Blocker, Jr. The special Surgical Unit, accommodating 56 beds, is devoted to plastic and maxillofacial surgery and neurosurgery. The Unit includes operating rooms, laboratories, clinics, and staff offices. It was erected from surplus war buildings at a cost of \$40,000, which also was donated by the Sealy and Smith Foundation.

Dr. Robert Bennett, medical director of Warm Springs Foundation, Georgia, gave a special seminar on the management of infantile paralysis during the recent physical medicine conference held there.

Dr. H. Tiselius of Uppsala, Sweden, well known for his studies of large molecules, gave a special address April 12 on "Chromatographic Studies of Medical Interest."

Dr. William Menninger, director of the Menninger Clinic, Topeka, Kansas, and chief consultant in neuropsychiatry to the Surgeon General of the Army during the war years, gave a series of seminar discussions, particularly on the role of psychiatry in general practice.

Dr. Shih Yuan Tsai of Shanghai has been appointed fellow in internal medicine. Dr. Tsai, who is an honor graduate from the Pieping Union Medical College, plans to prepare himself for a teaching and research career in medicine in his native land.

Dr. Walter Freeman, professor of neurology at George Washington University Medical School, Washington, D. C., recently demonstrated the famous "ice-pick operation" before the Psychiatry Clinic. Dr. Freeman gave a special lecture on the theory of prefrontal lobotomy.

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New York University College of Medicine

The annual John Wyckoff lectures at New York University College of Med-

icine were delivered March 28 and 29, by Dr. W. Barry Wood, Jr., professor of medicine, Washington University School of Medicine. Dr. Wood spoke on "The Mechanism of Recovery in Acute Bacterial Pneumonia." This lecture was the eleventh given under the John Wyckoff Lectureship, established by the Phi Delta Epsilon Fraternity.

Dr. J. William Hinton has been appointed professor of surgery at the Post-Graduate Medical School, New York University-Bellevue Medical Center. Dr. John H. Mulholland remains as professor of surgery, University College of Medicine and director of the Third Surgical Division, Bellevue Hospital. In the new post, Dr. Hinton will be director, Fourth Surgical Division, Bellevue Hospital, and continue as director of surgery at University Hospital, 303 East 20th Street, formerly Post-Graduate Hospital.

Beginning March 3, the Institute of Industrial Medicine of the New York University-Bellevue Medical Center, inaugurated a course in "Medicine in Industry" for third year students. Extending over a period of 12 weeks, the course will include lectures in dust diseases, lead, solvents, dermatoses, psychiatry in industry, applied physiology of respiration as applied to dust diseases, organization and administration of industrial medical departments, physical factors in the industrial environment, the role of research, and physical examinations.

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Western Reserve University School of Medicine

Dr. Alan R. Moritz, professor of legal medicine at Harvard University, has been appointed professor of pathology and director of the Institute of Pathology at Western Reserve. He succeeds Dr. Howard T. Karsner, retired.

A twelve months' training course in the disciplines of cardiovascular research for a limited number of qualified individuals will be offered with the support both of the American Heart Association and the National Heart Insti-

tute, U. S. Public Health Service. If the enrollment warrants, the course will begin July 1, 1949; otherwise September 1, 1949.

Graduates and undergraduates in medicine or related sciences who are highly recommended and acceptable to the director, Dr. Wiggers, are eligible. No tuition fees. Candidates able to support themselves or on fellowship grants from foundations or institutions are eligible. The Division of Research and Fellowships of the National Institute of Health in cooperation with the National Heart Institute is prepared to offer research fellowships for this training to acceptable candidates who require financial support.

The maximum number that can be accommodated is ten. In the event that applicants exceed this number, preference will be given to persons manifesting a strong interest in becoming career investigators. For details write: Dr. C. J. Wiggers, Director of the Department of Physiology.

Dr. Howard T. Karsner, professor of pathology since 1914 and director of the Institute of Pathology, will retire from the medical school faculty at the close of the present academic year. He will then become medical research adviser to the Surgeon General of the Navy.

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Bowman Gray School of Medicine of Wake Forest College

Dr. Thomas T. Mackie, director of the Institute of Tropical Medicine, heads a group of five staff members who left March 1 to establish a laboratory at Boca Chica in the Dominican Republic. The group, which includes Dr. Janet Mackie; Miss Bessie Sonnenberg, parasitologist of the Veterans Administration's tropical disease clinic; Herbert Cox, research assistant; and John Booe of Winston-Salem, will study parasitic intestinal infections and malaria control under auspices of the West Indies Sugar Corporation.

Dr. Parker R. Beamer, Washington

University Medical School, has been appointed professor of microbiology and immunology and associate professor of pathology. Dr. Richard L. Masland has been promoted to associate professor of neuropsychiatry in charge of neurology, and J. Maxwell Little, Ph.D., to the position of professor of pharmacology and associate professor of physiology. Dr. Katherine H. Anderson is now assistant professor of clinical pediatrics and Dr. Elizabeth Conrad is instructor in clinical pediatrics.

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University of Vermont College of Medicine

Correction. In the March issue, page 117, of the Journal, it was stated that Dr. Christopher M. Terrien is professor and head of the department of medicine. Dr. E. L. Amidon occupies that position. Dr. Terrien is chairman of the medical service at the Bishop DeGoesbriand Hospital.

The Vermont Association for the Crippled and the faculty of the College of Medicine of the University of Vermont are sponsoring jointly a course in the diagnosis and treatment of convulsive disorders. The lectures are designed to meet the needs of the general practitioner. Registration will be at 8:30 A. M., April 18, and the lectures will extend through April 23.

The guest speaker, Dr. W. G. Lennox of the Neurological Institute of the Children's Medical Center, Boston, will give two lectures on various phases of epilepsy.

Members of the University faculty who will speak will include Dr. Hiram E. Upton, Psychiatric and Sociological Aspects of Epilepsy; Dr. Nicholas B. Dreyer, Toxicology of the Anti-convulsive Drugs; Dr. Arthur B. Soule, Neuro-radiology; Dr. L. S. Waldman, Neurological Examination and the Role of Pneumoencephalography; Dr. C. W. Stephenson, The Electro Encephalograph; and Dr. R. M. P. Donaghy, Classification and Surgical Treatment of Convulsive Disorders.

University of Wisconsin Medical School

An intensive study of arthritis and rheumatism will be initiated as the result of a gift of \$10,300 from the Thomas E. Brittingham trust fund. Dr. D. M. Angevine and Dr. C. H. Altshuler of the department of pathology, who have been conducting histochemical studies of rheumatic disease for the past two years, will receive \$5,300 to finance their work. Four thousand dollars will be used for electromyographic apparatus for the study of muscular changes in arthritic conditions. Dr. Harry Bauman of the department of physical medicine, an authority on muscle physiology, will be in charge of the study. Dr. C. V. Seastone of the department of microbiology, who has worked on streptococci infections for many years, will use \$1,000 of the gift to investigate sensitization reactions to streptococci in rheumatism and arthritic states.

Conrad A. Elvehjem, Sc.D., dean of the graduate school of the Medical School and chairman of the biochemistry department, received a grant of \$4,000 for research in nutrition from the Robert Gould Research Foundation, Cincinnati.

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Jefferson Medical College

The college has announced the institution of courses in the basic medical sciences leading to the degree of Master of Science and Doctor of Physiology.

The courses offered are in the major fields of anatomy, physiology, biochemistry, bacteriology, immunology, pharmacology and toxicology and pathology. The baccalaureate degree is a necessary requisite for admission to all courses except pathology, which requires the degree of Doctor of Medicine.

All courses will be open beginning September, 1949.

Dr. Abraham E. Rakoff, assistant professor of obstetrics and gynecology, will be in charge of a fellowship available to graduates in medicine who have had at

least one year or its equivalent of post-graduate training in obstetrics and gynecology. Applicants should communicate with Dr. Lewis C. Scheffey, professor of obstetrics and gynecology.

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University of Minnesota Medical School

Dr. Myron M. Weaver, assistant dean, has been appointed dean of the faculty of medicine of the University of British Columbia, which is about to be organized.

Dr. E. T. Bell, professor and head, department of pathology, University of Minnesota Medical School, delivered the annual Clarence M. Jackson Lecture on March 2 on the subject, "Pathology of Diabetes." The lecture is sponsored by the Phi Beta Pi Fraternity.

Dr. Ira T. Nathanson of the Massachusetts General Hospital delivered the annual George Chase Christian Cancer Lecture on March 3 on the subject, "Hormonal Alteration of Advanced Carcinoma of the Breast."

Dr. Edgar J. Huenekens, chief of staff at Sister Elizabeth Kenny Institute and clinical professor of pediatrics at Minnesota, has been appointed national medical director of the Kenny Foundation.

Dr. Harold Dinken, director of the Department of Physical Medicine and Rehabilitation, University of Colorado Medical Center, participated in a course in physical medicine given at the Center for Continuation Study at the University of Minnesota. The course was given for physicians engaged in the general practice of medicine. Dr. Dinken spoke on the subjects, "Physical Measures in Diagnosis" and "Rehabilitation of Hemiplegic Patients."

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Tulane University of Louisiana School of Medicine

A department of psychiatry and neurology for undergraduate and graduate training has been established. The new division will be headed by Dr. Robert

G. Heath, formerly of the Neurological Institute in New York. Graduate training will consist of a three year program. The medical curriculum on the undergraduate level has been expanded to include more courses in neurology and psychiatry.

New Appointments: Five full time instructors have been added to the faculty. Dr. Robert H. Hodes, formerly of the Johnson Foundation, University of Pennsylvania, research professor of neurology; Dr. Norman H. Rucker, psychoanalytical clinic, Columbia, assistant professor of psychiatry; Miss Helen Rushke, Presbyterian Hospital, New York, head of social services unit; Dr. Theodore Treuting, department of medicine, assistant professor of psychiatry; Dr. Frank Garcia, Neurological Institute, New York, instructor in neurology and neurosurgery; and Dr. David Freedman, Montefiori Teaching Hospital, Columbia, fellow in neurology. Dr. Garcia will correlate activities between the new division and the department of neurosurgery, headed by Dr. Dean Echols.

University of Utah College of Medicine

The Cancer Teaching Program of the college and the Bureau of Cancer Control of the State Department of Health presented the Second Annual Cancer Symposium April 25, 26 and 27. Guest speakers included: George T. Pack, M.D., clinical professor of surgery, New York Medical College; Charles E. McLennan, M.D., professor and head of the Department of Obstetrics and Gynecology, Stanford University College of Medicine; Henry S. Kaplan, M.D., professor and head of the Department of Radiology, Stanford University College of Medicine; Rulon W. Rawson, M.D., chief, Department of Clinical Investigation, Sloan-Kettering Institute of Cancer Research and associate professor of medicine, Cornell University Medical College; Howard L. Richardson, M.D., assistant professor of pathology, University of Oregon Medical School.

Dr. Stanley Marcus, formerly research

associate in bacteriology in the Horace H. Rackham Arthritis Research Unit, University of Michigan, has been appointed associate professor of bacteriology.

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Stanford University School of Medicine

Promotions: To professors: Dr. Donald James Gray in anatomy, Dr. Donald E. King in surgery (bone and joint), Dr. Hadley Kirkman in anatomy, Dr. John Kent Lewis in medicine.

Dr. Frank Gerbode will spend the next five months in medical research and teaching at Saint Bartholomew's Hospital in London. He has been granted a leave of absence to work in the newly established surgical research laboratory at the famous English medical center.

Dr. John A. Anderson, professor and chairman of the department of pediatrics at the University of Utah Medical School, will join the faculty September 1.

The sixty-seventh course of Popular Medical Lectures was initiated March 30 and continued through April 6, 20 and 27. Topics for discussion were Congenital Heart Disease, Cancer of the Uterus, Poliomyelitis, Blindness in Childhood.

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Marquette University School of Medicine

A Chair of History of Medicine has been created. Dr. G. Kasten Tallmadge will be professor of the history of medicine. He has been a member of the faculty for 18 years and is also assistant professor of anatomy.

Medical health talks slanted for the layman have been prepared by 10 student lecturers and are now available to Milwaukee civic and social groups on request. The students in the Marquette Medical Forum have developed talks on nine general topics: Cancer, animal experimentation, vitamins, drugs, the autopsy, heart disease, blood bank, the RH factor and first aid.

University of Louisville School of Medicine

Dr. John Walker Moore who will retire as dean July 1 has been named professor of the Alben W. Barkley Chair of Medicine, established for research in heart diseases. Funds for the first phase of the project will be provided by Vice-President Barkley's gift to the university of the \$10,000 Collier's Magazine award which he received last year for distinguished public service. It is reported that the Churchill Downs Race Track will be turned over to proper authorities to become a nonprofit organization, the proceeds of which are to go for the support of the medical school and allied projects. Dr. J. Murray Kinsman, professor of medicine, has been appointed dean to succeed Dr. John Walker Moore on his retirement June 30.

Johns Hopkins University School of Medicine

The department of obstetrics has begun a five year research study to evaluate methods used to control obstetric pain. The study was inaugurated by Dr. Louis M. Hellman and Dr. Robert A. Hingson, associate professors of obstetrics. Grants to underwrite the cost of the program were given by the Abbott Laboratories, Ciba Pharmaceutical Products, Eli Lilly & Company, Parke Davis & Company and E. R. Squibbs' Sons, Becton, Dickinson Foundation, Sharp & Dohme, Inc., Winthrop-Stearns Pharmaceutical Company and Merck & Company. The medical school, United States Public Health Service, the National Institutes of Health and the Sinai Hospital have provided clinical and laboratory facilities.

Washington University School of Medicine

A campaign to raise \$1,100,000 for a rehabilitation center has been launched. Purpose of the project is to provide health care and training to adjust people physically, mentally and vocationally for useful places in society.

Indiana University School of Medicine

The State has made a special grant of \$116,500 for the specific purpose of expanding its student enrolment in order to alleviate the shortage of doctors in Indiana. Twenty-one additional students have been admitted to the first-year class, now totaling 150. Dr. Emil Meirowsky has been appointed research assistant in surgery (oncology). The investigative work will be supported by a grant from the Indiana Elks Association through the Indiana Cancer Society.

Stritch School of Medicine of Loyola University

New Appointments: Dr. George J. Rukstinat, attending pathologist at Cook County, Loretto and Holy Cross hospitals, clinical professor of pathology; Dr. Louis F. Plzak, chairman of the department of surgery at Loretto Hospital, clinical assistant professor of surgery; Dr. Fred R. Zeiss, clinical associate in the department of bone and joint surgery, and Hugh J. McDonald, Sc.D., professor of physical chemistry and chairman of the department of biochemistry.

Wayne University College of Medicine

Dr. John Davis Green has been named a "Scholar in Medical Science" by the John and Mary R. Markle Foundation. Dr. Green is a graduate of Oxford University and a member of the department of anatomy.

George Washington University School of Medicine

A grant of \$36,861 to permit studies in the nerve supply of the human lung has been made to the Department of Surgery by the Veterans Administration. The grant will provide funds for studies with particular reference to the surgical treatment of asthma. Studies will be continued over a two year period.

University of Tennessee College of Medicine

The U. S. Public Health Service has recently announced grants-in-aid to support research projects in the department of physiology. A grant of \$8,386 has been made to Dr. Richard R. Overman to support an investigation on the Mechanisms of Ionic Imbalance in Malaria and Associated Pathophysiological States. The Registration of Gastrointestinal Motility with a Multiple Channel Inducto-graphic Technic under the direction of Dr. J. P. Quigley is supported by a grant of \$8,974.

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Ohio State University College of Medicine

A three year residence training program in psychiatry will be offered in the department of neurology and psychiatry. Quarters and subsistences will be available at the hospital for school residents. Stipend for veteran residents will be \$3,300 a year, and will vary from \$2,400 to \$3,000 for nonresident veterans. Applicants should address Dr. Dwight M. Palmer, Ohio State University, Columbus.

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Long Island College of Medicine

Mr. Henry A. Ingraham, for many years a member of the Board of Trustees of the college, has been honored by being elected "honorary trustee." Mr. Ingraham, the first chairman of the Board, resigned for reasons of health. He was largely instrumental in having the college established as a separate academic entity in 1930.

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University of Kansas School of Medicine

Dr. Paul W. Schafer, associate professor of surgery, has been appointed chairman of the department of surgery, succeeding Dr. Thomas G. Orr, head of surgery since 1924. Dr. Orr will remain professor of surgery but will be relieved of administrative duties.

Emory University School of Medicine

Dr. Walter H. Sheldon, associate professor of pathology, has been appointed professor and chairman of the department.

Dr. Corneille Heymans, professor of pharmacology of the University of Ghent, Belgium, has been appointed visiting professor of pharmacology.

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University of California Medical School

The regents of the university have approved for erection on the Los Angeles campus of a complete medical research center at a cost of \$15,500,000. This will include a medical school and teaching hospital of 500 beds. The dean of the school is Dr. Stafford Warren.

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Albany Medical College

In cooperation with the Albany Hospital, the college is offering a two year residency in anesthesiology to graduates of approved medical schools who have completed one year of an approved internship. For further information, applications should be made to Dr. Merel H. Harmel, Albany Hospital, Albany 1, New York.

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Harvard Medical School

Dr. Wilder G. Penfield, professor of neurology and neurosurgery at McGill University, gave three lectures on the Cerebral Cortex of Man, under the auspices of the Edward K. Dunham Lectureship founded in 1923. Dr. Oliver Pope has been appointed associate professor of surgery. He has been a member of the faculty since 1928.

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Georgetown University School of Medicine

Dr. Isadore Levin has been appointed associate professor of medicine in charge of the department of physical medicine.

General News

Clinical Clerkships in Army General Hospitals

For the past two years the summer camp has been conducted at the Army Medical Field Service School, Fort Sam Houston, Texas. The program of instruction consisted of military medical subjects together with orientation periods at Brooke General Hospital. This arrangement produced satisfactory results for the most part. However, the large proportion of veteran medical students has led to the conclusion that clinical clerkships in Army teaching hospitals will greatly enhance the present desire among this group for a medical career in the Army. The Surgeon General now submits the following plan:

Medical ROTC students who have completed their sophomore or junior academic year and are veterans with more than one year of active military service will be sent to selected Army General Hospitals for a six weeks' period during the summer instead of to the Medical Field Service School. During this period they will receive orientation in military matters, but the major share of their time will be spent as clinical clerks on the wards of the hospital. They will also attend as many of the regularly scheduled, formal teaching exercises as can be integrated into their program. Three to four clerks will be assigned to each intern for supervision and administration. A majority of the teaching will be accomplished by the residents and assigned and attending staff members. With few exceptions, the hospitals in which they will undergo this training are participating in the clerkship programs of nearby medical schools at present, and a majority of attending staff physicians are intimately connected with medical schools. It is believed that, with existing physical facilities, teaching staff and clinical material at these installations it will be

possible to afford these students an extremely valuable educational experience. Non-veteran students and veterans of less than one year of active military service will be sent to the Medical Field Service School for the regular camp.

The summer months will be divided into two periods. The first group will report to the hospitals on June 12 and the second on August 1. This is necessary in order to avoid overcrowding and to comply with the six weeks' restriction established by law. As has always been the case, the students will travel at government expense and will receive the pay of a private during the period (approximately \$110.00).

The Surgeon General will welcome suggestions and criticisms of this proposed plan.

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Eileen R. Cunningham Honored by Medical Library Association

Mrs. Eileen R. Cunningham, librarian of Vanderbilt University School of Medicine, was chosen as first recipient of the Medical Library Association's Marcia C. Noyes Award.

This award, named after one of the Association's charter members and its first woman president, was conferred upon Mrs. Cunningham in recognition of her outstanding achievements in medical librarianship. A past president of the Medical Library Association (1947-1948), Mrs. Cunningham is the author of "Classification for Medical Literature," as well as numerous papers pertaining to medical librarianship, medical bibliography and medical history. The award, a handsome sterling silver tray suitably inscribed, was presented to Mrs. Cunningham at the Medical Library Association's 48th annual meeting held at Galveston, Texas, on April 11.

Columbia University School of Library Service

The School of Library Service of Columbia University will offer a course in Medical Library Literature and Administration for the coming summer session, July 5 to August 12, 1949, and for the spring semester of the academic year 1949-1950, beginning about February 1, 1950. For matriculated students the course carries three hours of credit, but it is not necessary to register for a degree in order to take the course. Tuition is \$20.00 a point (credit hour), with a registration fee of five dollars in the spring semester and seven dollars in the summer semester.

Further information can be obtained from Dr. Lowell Martin, associate dean, School of Library Service, Columbia University, New York 27, N. Y., or Miss Estelle Brodman, School of Library Service, Columbia University, New York 27, N. Y. Early registration is advised.

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Jessie Horton Koessler Fellowship

The Institute of Medicine of Chicago announces that its Jessie Horton Koessler Fellowship for the aid of research in biochemistry, physiology, bacteriology or pathology will be available on September 1. The stipend is \$500 a year with the possibility of renewal for one or two years. Applications will be received up to July 1, and should be sent in quadruplicate to Dr. Paul R. Cannon, chairman of the Committee on the Jessie Horton Koessler Fund, 950 East 59th Street, Chicago 37.

* *

Association of Canadian Medical Schools

The seventh annual meeting of this association will be held in Quebec, September 16 and 17, 1949. The Hotel Frontenac will be headquarters and place of meeting. A symposium on the teaching of public health will form part of the program. The secretary of the association is Dr. J. F. McIntosh, McGill University Faculty of Medicine.

Scholarships for Medical Library Students

The Medical Library Association is sponsoring two scholarships of \$150 each for students taking the medical library course at the Columbia University School of Library Service during the summer quarter of 1949. Funds for this purpose have come from a gift made by the Lilly Research Laboratories.

Preference will be given to students giving evidence of an intention to stay in medical library work and who seem to have possibilities of making a real contribution to it through their work. It is expected that the individual either has or will have a library school degree at the end of the course.

Application should be made to the Columbia University School of Library Service, New York 27, New York.

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Honor to Women Physicians

In January, 1949, 12 leading women doctors of the United States, Canada, England and France were cited by Hobart and William Smith Colleges on the One Hundredth Anniversary of the Graduation of Elizabeth Blackwell, first woman doctor, who received her M.D. from the Medical Department of Geneva (now Hobart) College, January 23, 1849. Among prominent women physicians of the United States honored on this occasion were Dr. Florence R. Sabin, Dr. Alice Hamilton, Dr. Helen B. Taussig, Dr. Martha May Eliot, Dr. Gerty T. Cori, Dr. Priscilla White, Dr. Helen V. McLean, Dr. Margaret D. Craighill, Dr. Elise S. L'Esperance.

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Medical Library Association

The Medical Library Association will hold its 48th annual meeting, April 10-14, in the Medical Branch of the University of Texas, Galveston, Texas. Headquarters will be the Hotel Galvez. Among the speakers will be Dr. John F. Fulton, Dr. Elmer Belt, Dr. George H. Enton, Dr. Luther H. Evans, and others.

Book News

Surgical Technique and Principles of Operative Surgery

By A. V. Partipilo, M.D., Associate Clinical Professor of Surgery, Stritch School of Medicine, Loyola University, with a foreword by Alton Ochsner, M.D., William Henderson Professor and Director of the Department of Surgery, Tulane University School of Medicine. Ed. 4. Lea & Febiger, Philadelphia. 1949. Price, \$15.

Not only the text but the more than 500 beautiful and clarifying illustrations make this an outstanding text in surgical technique. The 53 chapters cover the fields of operation discussed thoroughly and with clarity. New chapters have been added on surgery of the chest, of the pancreas and of peripheral vascular diseases as well as facial injuries, duodenal obstruction, vagotomy, varicocele and hydrocele. There is all new material on ventral hernia and physiology of the stomach and physiological basis for the surgical treatment of peptic ulcers. Other chapters have been rewritten; many revised. Emphasis is placed on diagnosis, indications for operation and preoperative and post-operative treatment. Surgical anatomy is reviewed for each entity as well as the pathological, physiological and clinical aspect of each subject. The book really exhausts the subject.

* *

The Physiology of the Eye

By Hugh Davson, D.Sc., Honorary Research Associate, University College, London. With a foreword by Sir Stewart Duke-Elder, Ph.D., M.D. The Blakiston Company, Philadelphia. 1949. Price, \$7.50.

Presenting up to date material based on extensive research and long practical experience by an eminent physiologist. It is a new and practical presentation of specific facts of interest to specialists as well as general practitioners. Students will also find it helpful.

* *

The Mentally Ill in America: A History of Their Care and Treatment from Colonial Times

By Albert Deutsch. Ed. 2. Columbia University Press, New York. 1949. Price, \$5.50.

An account of the historical evolution of concepts and attitudes in the treatment and control of the feeble-minded is related in a vivid and unforgettable manner. The origin and evolution of mental hygiene is discussed. The physician, the social worker, the educator and the general reader will profit from reading this book.

Clinical Case Taking

By George R. Herrmann, M.D., Ph.D., Professor of Medicine, University of Texas. Ed. 4. The C. V. Mosby Company, St. Louis. 1949. Price, \$3.50.

A guide for the study of patients, a semiology of disease processes is a treatise on the art and science of securing a meaningful story of the patient's symptoms and a systematic examination for the signs of disease. The author's vast experience as a teacher for many years assures the value which this book has for medical students. The Table of Contents has been so arranged that it may be used as a working outline and may be memorized as a guide when the manual is no longer carried to the bedside.

* *

Oral Anatomy

By Harry Sicher, M.D., Professor of Anatomy and Histology, Loyola University School of Dentistry. The C. V. Mosby Company, St. Louis. 1949. Price, \$15.

This book is intended to replace selected chapters of a textbook of anatomy in the freshman course, but also to accompany the student through his clinical years and to serve as a basic introduction to many practical courses. The book is based on a German text written in collaboration with Dr. Julius Tandler of the University of Vienna. The many hundreds of fine illustrations deserve special commendation. They add materially to the text by way of elucidation.

* *

Obstetric Analgesia and Anesthesia: Their Effects Upon the Labor and the Child

By Franklin F. Snyder, M.D., Associate Professor of Obstetrics and of Anatomy, Harvard Medical School. W. B. Saunders Company, Philadelphia. 1949.

A complete but concise discussion of the various anesthetic agents used in obstetrics and their effect on the child in particular, such as respiration before birth; intrauterine pneumonia; atelectasis; asphyxia.

* *

Surgery of the Eye

By Meyer Wiener, M.D., Emeritus Professor of Clinical Ophthalmology, Washington University School of Medicine. Ed. 2. Grune & Stratton, Inc., New York. 1949. Price, \$12.

Revised and much of it rewritten. Too deep for the student; good for the specialist.

Clinical Endocrinology

By Laurence Martin, M.D., Physician to Addenbrooke's Hospital, Cambridge, and Martin Hynes, M.D., Reader in Medicine, University of Cambridge, with a foreword by Sir Lionel Whitby, M.D., Regius Professor of Physic, University of Cambridge. The Blakiston Company, Philadelphia. 1949. Price, \$4.50.

A practical discussion of endocrinology, arranged gland by gland, with description of diseases affecting each gland and their treatment.

* *

The Business Side of Medical Practice

By Theodore Wiprud, Secretary, the Medical Society of the District of Columbia. Ed. 2. W. B. Saunders Company, Philadelphia. 1949.

Every graduate in medicine should have and read carefully this well written book. It fills a great need. It helps the young graduate to adjust himself to private practice and to do those things which are so essential to successful practice. It covers a large field in a most thorough manner.

* *

Collateral Circulation

By Daniel P. Quiring, Ph.D., Head of Anatomy Division, Cleveland Clinic Foundation and Associate Professor of Biology, Western Reserve University. Lea & Febiger, Philadelphia. 1949. Price, \$5.

Presenting the anatomical aspects of collateral circulation. Medical students will find it useful as a guide to the chief anastomosing channels; revascularization of the heart and other conditions in which a collateral circulation is essential to life.

* *

Blood Transfusion

By Elmer L. DeGowin, M.D., Associate Professor of Internal Medicine, State University of Iowa; Robert C. Hardin, M.D., Assistant Professor of Internal Medicine, State University of Iowa, and John B. Alsever, M.D., Senior Surgeon U. S. Public Health Service. W. B. Saunders Company, Philadelphia. 1949.

The entire field of blood transfusion is covered, especially whole blood transfusion. The text is complete.

* *

Your Child or Mine

By Marie Louise Hart Burton and Sage Holter Jennings. Coward-McCann, Inc., New York City. 1949. Price, \$1.25.

A splendid book, presenting an excellent description of the types of cerebral palsy and their outcome with treatment.

The Pharmacologic Principles of Medical Practice

By John C. Krantz, Jr., and C. Jelleff Carr, respectively Professor and Associate Professor of Pharmacology, School of Medicine, University of Maryland. The Williams & Wilkins Company, Baltimore. 1949. Price, \$10.

The clinical application of the action of drugs is emphasized. The subject matter is arranged according to the physiologic systems of the body. It includes a synopsis of the physiologic and biochemical functioning of these systems as a basis for the understanding and interpretation of drug action. Only drugs in every day use are discussed. The bibliography is selective. Students will get much out of this book especially the short chapter on typical prescriptions.

* *

Symptoms in Diagnosis

By Jonathan Campbell Meakins, M.D., formerly Professor of Medicine and Director of the Department, McGill University. Ed. 2. The Williams & Wilkins Company, Baltimore. 1948. Price, \$7.50.

Dealing with the interpretation of symptoms by systems. Good clinical sense is evident and there has been a careful selection of illustrations, not too many in number. The text has been revised and much of it rewritten.

* *

Practical Aspect of Thyroid Disease

By George Crile, Jr., M.D., Department of Surgery, Cleveland Clinic. W. B. Saunders Company. 1949. Price, \$6.

Based on the author's unusually large experience in this field. He stresses the importance of making the decision whether to operate or not. The discovery of new drugs, which have an important bearing in non-operative treatment, demands skill in the selection of cases for operation. This the author discusses in this handy little volume.

* *

Atlas of Neuropathology

By Wm. Blackwood, M.B., Assistant Pathologist, National Hospital, London, and T. C. Dodds, F.R.P.S., Department of Pathology, University of Edinburgh, and J. C. Sommerville, A.I.M.L.T., Department of Neuropathology, University of Edinburgh. With a foreword by Professor A. Murray Drennan, M.D., Professor of Pathology, University of Edinburgh. The Williams & Wilkins Company, Baltimore. 1949. Price, \$9.

Presenting the most important pathological conditions in a clear and simple way by means of several hundred well made illustrations with brief descriptions by way of text.

Handbook of Diseases of the Skin

By Richard L. Sutton, M.D., and Richard L. Sutton, Jr., M.D., respectively Emeritus Professor and Associate Professor of Dermatology and Syphilology, University of Kansas Medical School. The C. V. Mosby Company, St. Louis. 1949. Price, \$12.50.

Written especially for the medical student. Illustrations, in excess of 1,000, will be appreciated by the student as well as the practitioner because they really illustrate. The limited size of the book, based on the larger work written by the authors, make it an ideal student's text.

* *

Human Embryology and Morphology

By Sir Arthur Keith. Ed. 6. The Williams & Wilkins Company, Baltimore. 1948. Price, \$10.

This book has been a standard student text for 47 years, therefore needs no recommendation. It has been revised and enlarged.

* *

Recent Advances in Respiratory Tuberculosis

By Frederick Heaf, M.D., and Lloyd N. Rusby, F.R.C.P., London. Ed. 4. The Blakiston Company, Philadelphia. 1948. Price, \$5.50.

Complete coverage of the field.

Atlas of Peripheral Nerve Injuries

By William R. Lyons, Ph.D., Associate Professor of Anatomy, University of California Medical School, and Barnes Woodhall, M.D., Professor of Neurosurgery, Duke University Medical School. W. B. Saunders Company, Philadelphia. 1949. Price, \$16.

This truly monumental work presents the peripheral nerve pathology of war wounds, being a collaborative effort of a neuropathologist and a neurosurgeon. The nearly 1,000 illustrations, some in black and white, others in colors, with the accompanying explanatory text, make of this work a book which is deserving of the highest commendation. Even he who is not a worker in this field of practice will enjoy studying the illustrations. They are beautiful and most instructive. It is a book well worth having even if one merely browses through it.

* *

An Elementary Atlas of Cardiography

By H. Wallace-Jones, M.D., E. Noble Chamberlain, M.D., and E. L. Rubin, M.D., all of the Royal Liverpool United Hospital. John Wright & Sons, Ltd., Bristol, England. 1948.

An introduction to electrocardiography and X-ray examination of the heart.

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